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The Serpents of Thailand and Adjacent Waters

BY

EDWARD H. TAYLOR

ABSTRACT: This review of the serpents of Thailand is based largely on the herpetological collections made in the years 1957-1961 in Thailand and adjoining countries by the author. This fauna is treated under ten families, 58 genera, 159 species and subspecies; certain unnamed varieties are discussed.

Many of the emendations of generic names have been disregarded in accordance with an interpretation of the recent laws of nomenclature and *Aplopeltura, Gerarda, Erpeton, Calliophis, Aipysurus* are used instead of *Haplopeltura, Gerardia, Herpeton, Callophis* and *Aepyurus.*

The most recent listing of Thai snakes is that of Taylor and Elbel (1958) in which 129 names appeared; certain ones have been dropped from the list and the following names are added:

Typhlops khoratensis Taylor
Typhlops trangensis Taylor
Typhlops diardi Schlegel
Typhlops siamensis Günther
Python curtus Schlegel
Sibynophis melanocephalus Gray
Gonyosoma floweri (Werner)
Gonyosoma jansenii elegans (Werner)
Elaphe taeniura ridleyi (Butler)
Oligodon cinereus swinhonis (Günther)
Oligodon cinereus multifasciatus (Jan)
Oligodon cyclurus superfluens subsp nov.
Oligodon cyclurus smithi (Werner)
Liopeltis baliodeirus cochranae Taylor
Calamaria leucocephala Duméril, Bibron and Duméril
Calamaria uniformis M. Smith
Boiga drapiezii (Boie)
Boiga dendrophila melanota (Boulenger)
Boiga nigriceps (Günther)

Boiga jaspidea Duméril, Bibron and Duméril
Boiga cynodon var.
Calliophis macclellandii macclellandii Reinhardt
Calliophis maculiceps malcolmi Taylor
Calliophis gracilis Gray
Astrotia stokesii (Gray)
Trimeresurus erythrurus Cantor
Trimeresurus sumatranus (Raffles)
Trimeresurus stejnegeri K. Schmidt

No evidence is at hand for the retention of *Enhydris chinensis* (Gray) in the list. *Trimeresurus puniceus* (Boie) of the former list is the same as *Trimeresurus kanburiensis* M. Smith. *Natrix modesta* (Günther) is dropped, and *Boiga d. dendrophila* of the former list is the same as *Boiga d. melanota* (Boulenger).

Most of the species considered are redescribed from Thai specimens and 125 figures, mostly photos of entire specimens in black and white, illustrate more than one hundred of the forms.

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INTRODUCTION

METHODS

The general plan of this work follows that of the "Amphibians of Thailand," published in 1962 and "The Lizards of Thailand," published in 1963. Since those works were completed the new International Rules of Nomenclature and Procedure has been published. In consequence, in this work on the serpents* I have attempted to follow the proposed regulations, such as the use of the colon after authors names in the listing of literature, and the recording of type-localities for original names and synonyms where these are known.

The spelling of Thai geographic names has caused no small difficulty since the available maps show great diversity. This is because the Thai alphabet has many more characters available than the English and there maybe no consensus as to the proper spelling of the Thai word and certainly none for the proper method of its transliteration into English. In reporting the distribution of the various species, I have listed, for the most part, only the Changwat or province, rather than publish a catalogue of all the specimens collected. This of course is a measure for economy. In the spelling of the provincial names I have used that of the U. S. Army Gazetteer of 1944. I have attempted to follow the same criterion for other geographic names but there are perhaps some inconsistencies in the spellings. One other difficulty has been the fact that the geographical divisions have themselves been changed. Thus formerly much of the present southern part of peninsular Thailand consisted of Pattani province which was further divided into several smaller states. These have now ceased to exist and the former Pattani now consists of three changwats, Pattani, Narathiwat and Yala, and perhaps a part of Songkhla.

The specimens in the collection of Chulalongkorn University largely brought together by me form the basis for this study, and all numbers unless otherwise designated belong to that collection. In a number of cases other specimens have been photographed or described, and abbreviations, to designate the source of the specimen, have been used. These abbreviations are as follows:

ANSP	Academy of Natural Sciences, Philadelphia.
AMNH	American Museum of Natural History, New York.
B.L.	Private collection of Dr. Boonsong Lekagul, Bangkok, Thailand.
B.M.	British Museum (Natural History) London.
C.U.	Chulalongkorn University (recent acquisitions) Bangkok, Thailand.

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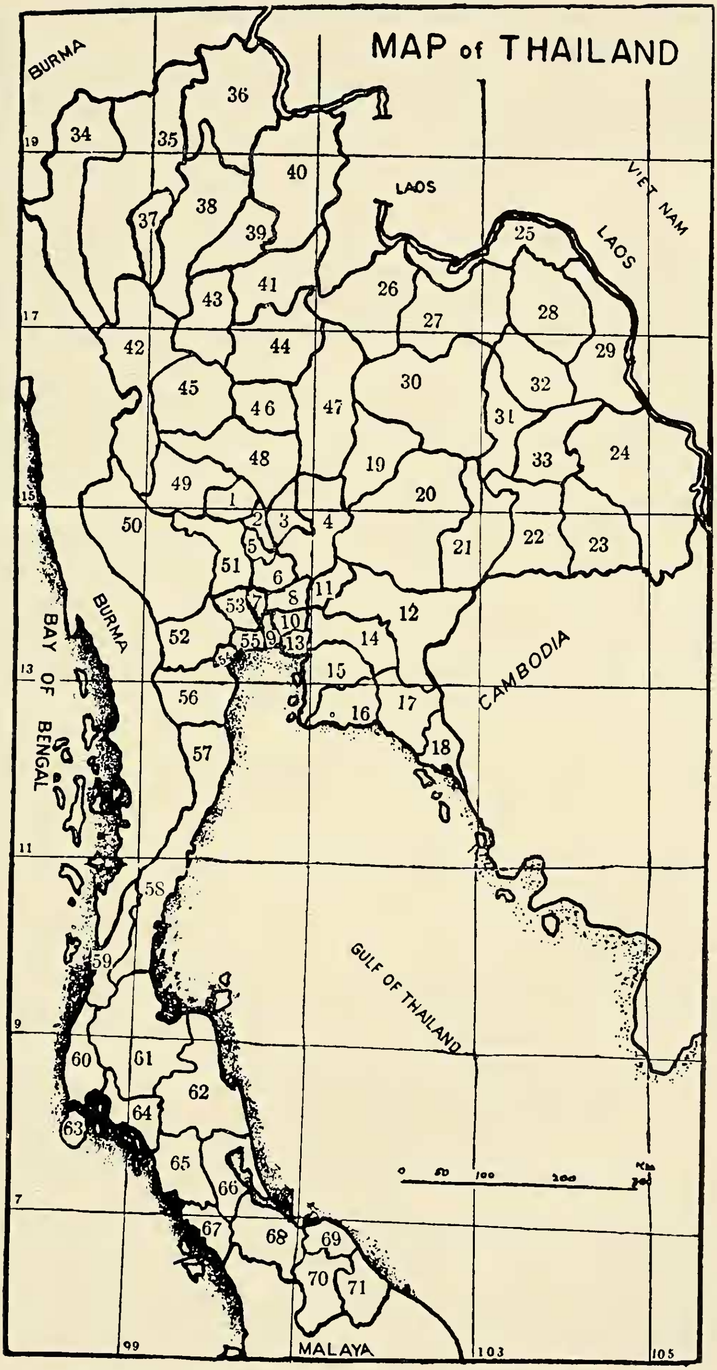
* The names serpent and snake are regarded as synonyms and used interchangeably.

EHT-HMS	Edward H. Taylor-Hobart M. Smith collection, Lawrence, Kansas.
KUMNH	Kansas University Museum, Lawrence, Kansas.
M.S.	Private collection of Malcolm Smith, largely in the British Museum (Natural History) London.
P.K.	Private collection of Nai Prayoon Kananuracks, Na Pradoo, Pattani, Thailand.
USNM	United States National Museum, Washington, D. C., U. S. A.

LIST OF THAI PROVINCES

(Corrected spellings as used by the U. S. Army Gazetteer, 1944)

1. Chainat
2. Sing Buri
3. Lop Buri
4. Sara Buri
5. Ang Thong
6. Ayutthaya
7. Nonthaburi
8. Pathum Thani
9. Thon Buri
10. Phra Nakhon (Bangkok)
11. Nakhon Nayok
12. Prachin Buri
13. Samut Prakan
14. Chachoengsao
15. Chon Buri
16. Rayong
17. Chanthaburi
18. Trat
19. Chaiyaphum
20. Nakhon Ratchasima (Khorat)
21. Buriram
22. Surin
23. Khu Khan (Sisaket)
24. Ubon
25. Nong Khai
26. Loei
27. Udon Thani
28. Sakon Nakhon
29. Nakhon Phanom
30. Khon Kaen
31. Maha Sarakham
32. Kalasin
33. Roi Et
34. Mae Hong Son
35. Chiang Mai
36. Chiang Rai
37. Lamphun
38. Lampang
39. Phrae
40. Nan
41. Uttaradit
42. Tak
43. Sukhothai
44. Phitsanulok
45. Kamphaeng Phet
46. Phichit
47. Phetchabun
48. Nakhon Sawan
49. Uthai Thani
50. Kanchanaburi
51. Suphan Buri
52. Rat Buri
53. Nakhon Pathom
54. Samut Songkhram
55. Samut Sakhon
56. Phet Buri
57. Prachuap Khiri Khan
58. Chumphon
59. Ranong
60. Phangnga
61. Surat Thani
62. Nakhon Si Thammarat
63. Phuket
64. Krabi
65. Trang
66. Phatthalung
67. Satun
68. Songkhla
69. Pattani
70. Yala
71. Narathiwat



MAP NO. 1. Provinces (Changwats) of Thailand. The numbers refer to the numbered list of provincial names, and have no significance in themselves.

In preparing the synonymies and listing the literature no attempt has been made to make them complete.

The figures in practically all cases are photographs of preserved specimens submerged in a clear liquid. The actual size of the specimen is given in the caption.

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In my collecting and study of the serpents of Thailand, and in the preparation of this publication I have placed myself under considerable obligation to many friends, numerous institutions and individuals associated with them who have assisted me by providing space and equipment for work, housing of the specimens, and for the privilege of examining specimens under their care and the use of libraries and other facilities. To Chulalongkorn University, Bangkok and its most able secretary-general, Dr. Supachai Vanijvadhana, I offer my sincerest gratitude since it was his ideas that initiated this work. He was kind enough to provide ways and means for pursuing the project in the form of Fulbright Grants.

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Kananuracks, of Na Pradoo Pattani, for his splendid hospitality, many specimens, and the privilege of studying specimens in his private collection made in southern Thailand; and to Oliver Gordon Young and his father, Harold M. Young, whose specimens, collected in the northern province of Chiang Mai, have contributed greatly to our knowledge of the northern Thai fauna;—to all of these my heartfelt gratitude.

GENERAL CONSIDERATION OF THE SERPENTES

Body form: It is somewhat astonishing to discover that the body form of serpents is invariably serpentiform! This is remarkable since we find that the Serpentes were developed from quadrupedal ancestors.

Why have they been cast in so limited a variety of molds? Seeking for a reason one might draw on modern cognate happenings in the lizards, where representatives of certain families are seemingly acquiring bodies cast from molds somewhat similar to those of the serpents. This we may interpret as resulting from food competition among species, usually between two related forms, and the more successful one becoming dominant and extinguishing the other competitor by utilizing the available food; that is, unless the latter can find new sources of food which it may obtain without strong competition or for which it may compete successfully. Perhaps the subterranean food sources, the ones nearest at hand, are consequently more desirable than new food source at a greater distance.

In these circumstances the most successful of species, so dominated, will be those whose environments select mutations involving the reduction of appendages, since this type of mutation would appear to have the highest survival value for species foraging below the surface, seemingly permitting subterranean locomotion and food-finding with greater ease. Often the only species of such a lizard group genus to survive, will be one that approaches the serpentine form most closely, that is, with total or almost total loss of the paired appendages, and a serpentine body.

If we consider the serpent as having undergone such an evolution, we must further postulate that at some time in the past the competitor itself has been eliminated and the animal has secondarily emerged from its subterranean habitat and has in this form of a four-time-amputee, reconquered many of the food sources of the earth. The serpents now are seemingly able to compete for food in most parts of the world; able to move about from sea level to elevations of 3000 meters or more; to climb trees and assume an arboreal habitat; to compete with fresh water feeders in an aquatic medium. They have even entered the sea to compete successfully there with marine animals. Some even have secondarily gone underground, becoming burrowers, or occupying caves. They have redistributed themselves from Hudson bay to Tierra del Fuego, from Scandinavia to Tasmania. Perhaps the modern serpent is one of the greatest of all evolutionary miracles!

Tails: Practically all serpents have retained tails. Among the genera of the Typhlopoidae, Leptotyphlopidae and Aniliidae the tails are greatly reduced in length, occupying only a few millimeters of the total length. These are for the most part burrowing snakes and the tail may bear a terminal downward-directed spine for aid in locomotion.

In arboreal snakes several types of tails are known, occasionally comprising as much as a third or more of the total length. This presumably serves, through the added length, as a survival character in preventing falls. If an arboreal form has a short tail it may become a grasping organ and this grasping ability likewise may serve as a survival character. Thus an arboreal snake attempting to strike at prey may find that the grasping ability of the tail will keep the body from being thrown completely from a limb, or the tail of greater length may prevent too great a fall by stretching over branches should it begin to fall.

In the males the hemipenes are housed in the base of the tail. In the case of certain American crotalid snakes a groups of noise-making scales are retained as a rattle at the end of the tail. In a few cases a small tail, brightly colored, is moved seemingly for the purpose of attracting small animals on which the tail owner feeds. Among American snakes many species of other families "rattle" the tail in leaves or on some surface to produce a sound not too unlike the rattle of the Crotalid.

Body covering: Since serpents inherited a covering of armour over the body in the form of horny or keratinous scales, it would appear that it has never been wholly lost and that such mutations, as may have occurred toward loss of this armour-plate, have been lethal, since no such forms have survived. However there have been ample change in this covering and often the present arrangement of scales, their numbers, size, ornamentation, position, serve as indicators of relationships among species and groups of species.

Some of the most striking scale variants are as follows:

1. All body-scales are practically the same size and shape, one or two transverse rows corresponding to a vertebra (perhaps three in some cases), the number of longitudinal rows varying considerably. The scales of this type are of little service in locomotion except that often a terminal spike is present which allows the body to push itself forward (Typhlopidae).
2. Differentiation of the scales so that a series of widened ventral develops that may aid in locomotion; transverse dorsal scale series may be arranged obliquely as in many Colubrid snakes.
3. A secondary reduction in the size of the ventral series (or its complete or partial loss) as in most marine serpents (Hydrophiidae).
4. One of the most remarkable and unusual conditions is the presence of specialized groups of enlarged platelike dorsal scales mixed with smaller ones (as occurs frequently in lizards but rarely in snakes (*Xenodermus*).
5. An excess of decoration of individual scales associated with a great number of longitudinal scalerows (130-150) (*Acrochordinae*).
6. The presence of small or granular scales on head while the body-scales retain the typical colubrid form (*Crotalidae*).
7. Variation in the arrangement of scales so that they tend to overlap (imbricating) or separating so that they lie side by side (juxtaposed as in many sea-serpents) or separated still further so that areas of bare skin intervene between scales (*Bitia*).
8. Specialization of individual scales such as the presence of apical pits; development of spines or tubercles on scales throughout the body or the reduction of this tuberculation to a small area on the sides in the region of the vent in males.
9. The development of glandular pits in scales, such as in the labials of the Boidae.
10. The presence of an extremely fine grill-work on the unattached undersurface of the scales of many Typhlopidae; of keels and minute sculpturing or striae on the dorsal surface of the scales of many species.
11. Shape of the individual scales may vary and these may be rounded, hexagonal, pentagonal, quadrangular, arrow-shaped, slender, pointed, truncate behind, or granular.
12. The number of scalerows on the body is an important character and the number may vary at different points on the body. In a few snakes the number may remain practically the same throughout the body or there may be a slightly larger number anteriorly on the neck the same number throughout the greater part of the body and the reduction of two to four scalerows posteriorly. This reduction may come about through the dropping out of rows, or the fusion of two rows. Occasionally there is a large increase in number of scalerows from neck to the middle of the body and differences in count of 10 to 20 or more may obtain (some aquatic snakes).

In most serpents there is an uneven number of scalerows (the ventral row not counted). However, in the genus *Ptyas* some members of the genus have the uneven number, another species may have an uneven number anteriorly and an even number posteriorly, or, in one species, the number may be even throughout.

The actual number of scalerows varies from 8 to 10 (in *Chironius*), up to 150 (in *Acrochordus*).

Shedding: As in many animals the outermost portion of the skin or scales is not given food by the blood and soon dies but remains as a protective covering even though lifeless. This at regular times becomes loose and is removed from the body. While all Sauria and Amphibia shed this layer, the method of shedding varies. It is often, if not usually eaten in the Amphibia and Sauria, the mouth often serving as an aid in its removal. In serpents, when this skin-layer is ready to be shed, it is loosened about the mouth, and removed by moving the body past a rough surface which tends to hold the skin, permitting the animal actually to crawl out of the skin. To my knowledge this is never eaten by them. The number of times that shedding takes place in a year varies with the species and with the latitude in which the animal has its habitat.

Body glands: Malcolm Smith and Nakamura (1935) have pointed out the presence of nucho-dorsal skin-glands on the nuchal region of snakes in the genera* *Rhabdophis* (*Natrix*), *Macropisthodon* and *Balanophis*. These may be confined to the nuchal region or may extend the length of the body on the dorsum.

The function of the secretion of the glands has not been determined beyond question, the most likely probability being that it functions in courtship or mate-finding. Other odoriferous glands are to be found near the cloacal opening.

Head glands: Various glands in the cephalic region are present in serpents. These subsquamate glands are occasionally in evidence externally through transparent scales. Series of these can be seen in *Typhlops braminus*, seemingly following the sutures of the anterior head-scales. The large parotid gland in *Boiga* is often visible externally below the eye as a yellowish or whitish spot, sometimes a little elevated.

Most of the head glands open into the mouth. Smith records a supralabial, a parotid, a premaxillary or intermaxillary, an inferior labial, a nasal, an anterior temporal, a Harderian and a sublingual. Certain of these are the equivalent of salivary glands.

The parotid gland produces a secretion that is discharged into the mouth or in the case of poisonous snakes, into sacs at the base of the enlarged grooved or tubular teeth. The secretion is the venom or poison that, injected into an animal, has a deleterious effect, death often resulting from physiological happenings after the injection has been made. Usually the specific effect of such an injection is dependent on the quantity of venom injected. The deadliness of venoms varies considerably but in large part it is due to the size of the injecting apparatus, the size of the snake, and especially in the bulk of the victim bitten. A venom of a species, capable of killing its prey, might be practically harmless to man.

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* Dr. Smith's key of these snakes (1943, p. 284) is somewhat misleading. The section B, states "no nuchal gland or groove" while below are listed two forms, *callichroma* and *nigrocincta* both having nuchal glands, as correctly stated on a preceding page (15).

Danger from snakebite has always been greatly exaggerated as have often the statistics pertaining to the same. While the poison gland is usually confined to the head region, snakes of the genus *Maticora,* of which several representatives occur in Thailand, have a poison gland extending some distance back into the body cavity—sometimes as far back as the heart. The effect of the venom of this snake however is not known, but *Maticora bivirgata* reaches a length of six feet and is large enought to pose a definite threat to man.

Almost all the sea-serpents have a deadly poison but they may be handled, most of them seemingly unaware that biting is a means of self protection, or attack. While they may be exceedingly common in waters about coastlines the number of deaths reported from their bites is amazingly small.

The behavior of Kraits (genus *Bungarus*) is especially significant. A Gurka from Nepal when asked the name of the Krait said it was "'good snake' because it *never* bites; but if it does it kills you." I have teased the common Thai Krait, *Bungarus fasciatus,* which may reach a length of two meters, but even when teased or given rough treatment designed to anger or even injure the snake it will keep placing its snout against the earth refusing to strike or bite, often hiding its head with the folds of the body. Malcolm Smith (1943 p. 413) states that there is no published record of death of human beings, or even of human beings being bitten by this form. He further states that the Burmese maintain that it is not a poisonous serpent!

Cobras however are more excitable, and seem to be willing to use the venom for protection or as a weapon of aggression. A rather large specimen of the black cobra caught at Bang Saen was brought alive to Bangkok. Certain friends wished photographs of the snake. I insisted that they should wear eye-glasses as possible protection for their eyes, since this form is a "spitting cobra." The snake was turned loose on a lawn and teased, so that it assumed the erect threatening posture and actually came forwards towards me to attack as I walked backward. The photographs taken, the snake was replaced in its container; but a second time when loosened for further photographs it assumed the posture and came forward to attack, spitting the venom into the air. This reached my face as a fine mist as was evident from the surfaces of my eye-glasses.

Of the Thai snakes the following groups of snakes are known to be poisonous:

Subfamily Boiginae, with the genera *Boiga, Dryophis, Chrysopelea, Psammophis and Psammodynates.* The poisons are usually not regarded as dangerous to man. Quantities injected into small animals may cause their death.

Subfamily Homalopsinae including the genera *Enhydris, Homalopsis, Cerberus, Bitia, Gerarda* and *Erpeton.* These snakes have enlarged grooved fangs and poison, but must not be considered dangerous to man.

Family Elapidae, with the genera *Naja, Bungarus, Dendraspis, Calliophis* and *Maticora.* Of these genera *Dendraspis, Bungarus* and *Naja* are known to be deadly to man. This does not necessarily mean that every bite produces death since the quantity of venom injected is an important factor in the outcome of the bite.

Family Hydrophiidae with the genera *Hydrophis, Astrotia, Kerilia Kolpophis, Praescutata, Enhydrina, Acalyptophis, Thalassophis, Microcephalophis, Pelamis* and *Lapemis* are known to have deadly poison but relatively few deaths in man are reported from such bites. In no cases are snakes of this group aggressive, and very few of them will bite even when provoked. However, extreme care should be taken in handling them.

Family Viperidae; a single species, *Vipera russellii.*

Russell's viper, while not an aggressive snake, is dangerous and capable of inflicting a deadly bite.

Family Crotalidae is represented by the genera, *Trimeresurus* and *Agkistrodon.*

These snakes are equipped with poison and large fangs and at least some species are capable of injecting with a bite, a sufficient quantity of venom to produce death. While many bites from serpents of the genus *Trimeresurus* produce only dangerous wounds, they should be regarded as dangerous to man. *Agkistrodon* is regarded as being even more dangerous and it too has very large movable fangs.

Eyes: The serpents have lost movable eyelids, while the eye itself maintains ability of movement of a greater or lesser degree. The eye is covered by a watch-glass disc that is attached by tissue to adjoining scales, and its surface is shed with the surrounding surface when the skin is shed. Since the eye originally was developed to function under water, tears are produced behind the disc to create a surface of moisture so the eyes may function, the excess liquid being carried away through the naso-lachrymal ducts.

Occasionally this watch-glass scale is eliminated by complete fusion with surrounding scales as in the genus *Typhlogeophis*. Whether the Typhlopidae and Leptotyphlopidae have ever had a typical watch-glass eye-scale covering the eye may be doubted. Here the eye is below a flat ocular scale or may be partially covered by two scales, and the eye may be visible or invisible. Such a change from a typical watch-glass type of eye covering, to the encroachment of the supraocular or other scale to cover the eye, is certainly a generic character.

Ears: Most of the readily recognizable external parts of the ear are wanting in the snakes. There is no external cartilage, no external auditory tube, no typical tympanum or tympanic cavity, nor is there a visible Eustachian tube. The inner ear consists of a columella which is situated between the fenestra ovalis on the skull and the quadrate bone. The canals and the essential sensory cells of hearing are, as normally, in the skull. A sense of hearing in snakes is present without question. Whether it is hearing resulting from the vibrations that are transmitted by air waves to the inner apparatus through the columella or by the other types of vibration through the body and muscles due to contacts with the earth may be a matter of debate.

Tongue: The forked tongue of all snakes may be extended beyond the mouth and is a conspicuous appendage. Among the sea-snakes, however, there are two openings for its extrusion and normally with the mouth closed only the two branches of the tongue can be extruded. It is a generally accepted idea that the tongue, rather than an organ of taste, maybe an organ of smell, that functions in connection with Jacobson's organ. The color of the tongue varies from pink, flesh color and gray to black.

Vertebral column: The vertebral column of snakes consists of a large series of separate bones that are interlocked. The number varies remarkably. In most snakes there is a vertebra for each ventral scale and each subcaudal or one for each transverse scale-row in most snakes. The ventral-subcaudal total number is as small as 150 in certain *Calamaria* while the number in certain sea-serpents reaches 564. I have not ascertained whether the vertebra are actually as numerous. The family *Colubridae* may be separated into two groups on the basis of the presence of hypapophyses on the ventral part of vertebra—HYPOPHYSA; on the absences of hypapophyses—ANHYPOPHYSIA.

Hemipenes: The intromittent organs of each serpent are two, and these, when not exserted, lie in pockets at the base of the tail. During congress, for the most part a single one is used at a time. E. D. Cope made an elaborate study of these organs and used their characteristics as a basis for classification. This is rather an involved procedure unless they are extruded. Malcolm Smith in his Fauna of British India, Serpentes (1943) has examined the hemipenes of most of the species of Thai snakes and recorded his findings. I have not utilized this character, largely because of the difficulty first of making the dissection and interpreting the findings. Only on rarer occasions is it called upon to serve as the sole character for separation of species.

In many cases the organs are covered with longer or shorter spines which may serve to prevent disunion during congress.

Mate-finding and courtship: Various types of sense organs are called upon in mate-finding. Sometimes this depends upon organs of hearing, sometimes touch, sometimes sight, sometimes odor; while often more than a single sense may be involved. Since there is an obvious minimum of external sexual dimorphism in serpents one would suspect that the sense of sight is not the primary sense involved. The inability to produce sounds audible at a distance would seem to preclude hearing as a factor.

Practically all snakes have anal glands which exude substances which volatilize to produce odors and which by diffusion and air-movement are carried considerable distances; or if in water diffusion likewise takes place and all odors are mechanically moved by waves and currents.

One concludes that the serpent's sense of smell is of significant importance as a species finding (mate-finding) sense. However sex recognition, once the members of the species are together, may depend on other senses such as touch or contact sense. Since most species are marked and colored in a specific manner, sight may be able to verify species recognition, but one suspects that small external dimorphic character differences, such as the micro-tuberculation of head-scales, differences in ventrals and subcaudal counts; differences in tail length and contour, or small color differences (*i. e.*, presence or absence of a white ventro-lateral line in male *Trimeresurus*) would not be likely to be a significant help in determining the sex.

As stated, many serpents have characteristic odors and at least in certain species might be identified by odor alone by man, as well as by their own kind.

Adaptation: In the evolution of the serpent following his presumed underground sojourn, various groups of individuals, in occupying new habitats which offered food and safety, became further specialized in their bodies, that is to say that the habitat tended to select the more favorable mutations (which are continually taking place in all animals). Thus we may suppose that those that sought food or safety in trees became specialized in climbing ability; and since elongate slender snakes, and snakes with compressed bodies and keeled ventrals seemingly climb better and move with greater ease and greater rapidity, they are more successful in food-finding. The compressed body gives greater strength in reaching out to a more distant branch. Thus mutations involving these characters were chiefly selected since all represent survival values.

Those that entered the sea for food became "specialized" perhaps in the swimming locomotion. The body in many forms became compressed, the tail actually compressed to form a thin paddle. Some of the poisonous sea-serpents actually specialized in obtaining food "underground" below marine waters, a source of food in the form of tiny serpentiform eels that themselves may have gone "underground" in search of food for which there was less competition. In this case seemingly only the serpent's head and the anterior part of the body became specialized. The head on certain such forms may be reduced to the size of a large barley grain. The neck and anterior body may have a diameter not or but little greater than the head. The posterior part may have a much greater diameter. This enables the snake to insert its head in an eel burrow, bite and poison the eel, and when dead withdraw the animal from its burrow and engulf it.

Transition from a marine habitat to a freshwater habitat may take place at the mouths of rivers extending into the sea. In a few cases typical marine forms have been taken in rivers unaffected by tidal water. Rising coasts often trap deep bays, first forming salt-lakes, but which, because of overflow, gradually lose the marine salts. This slow change permits a "period of grace" in which the animal may gradually adapt to the gradually changing environment. Occasionally volcanic flows rather than rising coasts separate bays from the sea, trapping at the same time their marine faunas. Thus in The Philippines, in Lake Taal, a lake perhaps so formed, the sea-serpent *Hydrophis semperi* is just such a trapped species.

Water consumption: Many snakes, such as pythons in the tropical fauna and crotalids in desert temperate regions, when in captivity may consume very little water. The water requirements are often met by the liquids in the bodies of the animals consumed as food, and the water developed in the process of metabolism. Others in captivity may consume more. Serpents seemingly are adapted so that the water-loss from the body is not great. Some water, of course, is lost in the process of breathing. Many snakes lose no perceptible amount of water in the process of urination and the salts eliminated from the body through the kidneys is sent via the cloaca and emerges from the body as a mass of white crystals together with the feces. Some liquids may be evident in the feces but the quantity is small. One concludes that loss through the surface of the body is negligible.

Sea-serpents living as they usually do in a medium containing an excess of salts and consuming water and animal flesh likewise permeated with salts probably have some special mechanism for the elimination of excess salts reaching the body fluids, since other vertebrates, (frogs, mammals, birds and turtles) living in the sea or feeding on marine organisms have developed such organs.

Sexual dimorphism: This is not strongly marked externally, but small differences do occur. Thus probably the best external criterion for determining the sex of a snake is an examination of the base of the tail, especially if the animal is adult, since there the hemipenes cause a swelling that is absent in females. In certain species, at least during the breeding season the scutes of the top, sides and underside of the head of males may have very numerous fine spines, tubercles, or minute knobs. Some other species may develop these decorations on a number of scales in the region of the vent. When a female is gravid, the presence of eggs or embryos may be discovered by lateral pressure on the body. But in a series where both sexes are known to be present relative measurement of body and tail will give a clue to the sex. In most females the body is proportionally longer and the tail proportionally shorter than in adult males of the same length. Further evidence can be ascertained by a count of the ventrals and subcaudals. Females normally have more ventrals and fewer subcaudals than the males. Examination of the base of the tail will show that in the males at the point where body and tail are joined the diameter of the two are nearly the same in adults. In females the body diameter normally is greater at this point than in males. In some snakes the count of scalerows about the various parts of the body is greater in the female than in the male. This has been observed in sea-serpents and to a much lesser extent in certain of the crotalids.

Differences in color or pattern between the sexes is not marked save in a few cases. In one Thai species of *Trimeresurus* a whitish or cream ventrolateral line is present in the male but is normally absent in the female.

The juvenile coloration is often more prounced than in the adult. Sometimes this juvenile type of coloration is retained with greater clarity in the male than in the female. In the Sauria this is usually the reverse, the female retaining the juvenile color and pattern longer than the male.

Classification and Evolution. The classification of serpents and their arrangement in an evolutionary series offers probably no greater problems than do other groups of the vertebrates. As has been suggested, we must regard the ancestors of snakes as quadrupedal animals, but the evolutionary happenings prior to the acquisition of the serpentine form has been largely lost in oblivion. We presume that the highly specialized serpent body had already been acquired before the present evolutionary trends began. That is, the immediate ancestor (or perhaps more than one) of the serpents was a very highly specialized creature and definitely not a generalized form. This is not surprising or unique since we may point to highly specialized animals as ancestors of Chiroptera or of the Aves, or in the reptilian group of the Testudines.

Since the serpent had lost its original parts or organs of locomotion, once it attempted to enter into competition with other than subterranean feeders its greatest need was the development of new parts or organs for locomotion of a different sort than it had been using; and since most food in the terrestrial world or superterrestrial world has many competitors and the food materials are in portions of varying sizes it became necessary for serpents to develop the means to acquire them. Thus we find that mutations developing along these lines were fixed by the environments, and organs came into being for overtaking, holding and swallowing these various types of food. One of our older concepts in zoology is that all adaptations may be retained for either of the two basic ends of existence—self and race preservation. Thus we might classify all the various acquisitions or adaptations in relation to these basic ends. Some adaptations might appear in both categories since locomotion involved in climbing might be just as important in mate-finding as in food-getting. The development of special excretory substances in glands, for its injection by hypodermic fangs would appear primarily as devices for food-getting. The use as a defense is no doubt secondary. The partial suppression of certain sense organs (hearing) and the development of others such as the facial-pit organ of the Crotalids, labial-pit organs of the pythons may be regarded in connection with the obtaining of food, while the elaboration of nuchal glands, and anal glands are likely to serve primarily in mate-finding. Such adaptations as the development of a ligamentous attachments of the lower jaws to replace a solid bony attachment; the muscular development permitting constriction of prey; an egg-crushing mechanism resulting from the perforation of the esophageal walls by the anterior vertebrae; the development of elongated non-grooved holding teeth, of teeth curving backwards in both maxilla and mandible, or the production of a very high number of teeth small and of equal size (Sibynophinae), are all adaptations having to do with catching prey holding it, or consuming it.

When one further considers this field of adaptations one wonders why there have been no adaptations for the use of plant food, as have appeared in the Sauria and in certain other groups of reptiles. If such mutations have occurred we must presume that they proved lethal. Nor are many adaptations discernible for the use of invertebrates for food. Members of the Family Dipsadidae do make use of invertebrate molluscs, and young snakes and some adults of many groups consume invertebrates (worms and insects). A few species have developed appetites for eggs of both birds and reptiles while others have a liking for the eggs and larvae of amphibians.

CLASS REPTILIA

SUBCLASS SYNAPTOSAURIA

Living animals belonging to the class *Reptilia* include turtles, crocodiles, Tuatera, serpents and lizards, but it is different to give a diagnosis based exclusively on external features since these are so diverse.

Many of the groups of reptiles, Subclasses, Orders, and Suborders, are extinct. These include the great dinosaurs, the phytosaurs, plesiosaurs, and a number of others less well known; but no attempt will be made to consider these.

Representatives of all living groups, with the exception of the Tuatera (Rhynchocephalia), occur in Thailand. There is little difficulty in distinguishing between crocodiles and turtles or between these groups and the serpents. However young crocodiles may have a superficial resemblance to some of the larger lizards.

In this work we are concerned with a single Order, the *Squamata* which includes both the Suborders *Sauria,* the lizards, and *Sepentes,* the serpents or snakes.

It is not always possible to distinguish between all members of these two groups without a careful examination of some of the internal or concealed anatomy. The absence of the limbs is not an absolute criterion since some lizards may lack trace of external limbs, while some serpents may have vestiges of external limbs.

ORDER SQUAMATA

SUBORDER SERPENTES

This group is treated here under ten family groupings, which may be differentiated by the following key:

KEY TO THE FAMILIES OF SERPENTES

1. Small serpents lacking widened ventral and subcaudal scales; eyes under head-shields visible or invisible, body scales uniform; tail short, *Typhlopidae*

   Small to large snakes, the eye usually visible, but if under head-shields, the ventrals are widened 2

2. Vestiges of hind limbs lateral to the vent; relatively narrow ventrals not as wide as body 3

   No vestiges of hind limbs 4

3. Ventrals scarcely broader than adjacent body scales; usually not more than 23 scalerows about body .... *Aniliidae*

   Ventrals much wider than adjoining scales; more than 40 scalesrows around the body .... *Boidae*

4. No enlarged grooved poison-fangs in the front of the mouth 5

   Grooved or tubular poison-fangs in anterior part of mouth 7

5. Teeth present on the premaxillaries; enlarged head-shields behind parietals .... *Xenopeltidae*

   No premaxillary teeth present, no greatly enlarged head shields behind parietals (except in *Dendraspis,* of the *Elapidae*) 6

6. A mental groove present .... *Colubridae*

   No mental groove present .... *Dipsadidae*

7. Maxillary bone longer, bearing teeth (with or without grooves) behind large anterior grooved fangs 8

   Maxillary shorter, usually bearing one or two large grooved or tubular fangs 9

8. Tail strongly compressed vertically; ventrals reduced or greatly reduced; maxillary with from two to 14 teeth following poison-fangs, *Hydrophiidae*

   Tail subcylindrical, not compressed; ventrals as wide or nearly as wide as body; none or one to five small teeth follow poison-fangs.... *Elapidae*

9. Maxillary bone not hollowed out; no lateral facial sensory pit.... *Viperidae*

   Maxillary bone hollowed and together with the prefrontal bone forms a deep pit on side of face .... *Crotalidae*

FAMILY TYPHLOPIDAE Günther

Typhlopsidae Gray, Catalogue of the lizards in the collection of the British Museum, 1845, p. 130 (*part.*).

Typhlopidae Günther, The reptiles of British India, 1864, p. 170.

Body cylindrical, its diameter nearly equal throughout; body-scales nearly uniform; imbricate; head-scutes imbricate. Pelvis usually present as a single bone or cartilage, but no external evidence of a limb; eye, covered with scutes, usually visible. Maxillary arch incomplete; skull lacking pterygoid and supratemporal bones; maxillary bone transverse, loosely attached to skull, with teeth directed backwards; no teeth on mandible; quadrate directed forwards.

Of the recognized genera, *Typhlops* is the largest and of nearly world-wide distribution in tropical and subtropical regions. It is known in Mexico, Central and South America, southern Europe, Africa, Madagascar, south Asia, the Indo-Australian Archipelago to and including Australia.

Unfortunately this family has not been studied too well and it would seem that the large genus *Typhlops* is a composite of several genera. Thus, as an example—some forms have a single row of scales for one vertebrae, some have two, and some perhaps three. Certainly these would be considered as generic characters in the Colubridae. Perhaps the reason for this failure to examine carefully the anatomy of these serpents is due largely to their small size.

Genus *Typhlops* Oppel

Typhlopes (part.) Schneider, Historiae amphibiorum naturalis et literariae, fasc. 2, 1801, p. 339.

Typhlops Oppel, Die Ordnungen, Familien und Gattungen der Reptilien als Prodrom einer Naturgeschichte derselben, Munich, 1811, p. 54 (type of genus, *Anguis lumbricalis*).

Diagnosis: Small burrowing snakes; snout projecting beyond mouth; head not distinct from neck; eye covered with scales, often invisible; nasal scute partially or completely divided; mouth ventral, upper lip bordered by rostral and four supralabials; rostral bent back over snout, often reaching level of eyes; an ocular preceded or not by a preocular, with or without a subocular; a supraocular normally present; rostral followed by a single prefrontal, a frontal, and an interparietal; one or two pairs of parietals not strongly differentiated from body-scales.

The number of species in this genus is large, exceeding two hundred, with doubtless many undiscovered forms.

The number of species heretofore recognized in Thailand is five. Two recently described ones and one revived species are also included here. All of the species are small, some especially so. *Typhlops braminus* reaches a length of about 180 millimeters, while the largest Thai species, *Typhlops diardi,* may attain a length of 430 millimeters.

The small to diminutive serpents of this family have a world-wide distribution in warmer temperate and tropic zones. Most of them are burrowers and they are usually to be found after rains under stones, boards, etc., on the ground. In a few cases they have become arboreal, occupying a habitat in the roots of epiphitic orchids or ferns, especially the "birds-nest" ferns of the Indo-Australian Archipelago and the Philippines. Other species have become adapted to a sand habitat, and I have obtained certain new forms from sand among mangrove trees in Ceylon.

At the present time some two hundred species are recognized in the genus *Typhlops.* An examination or re-examination of the skeletal apparatus of many of these species may with profit warrant the resurrection of certain of the numerous generic names already proposed and now buried in synonymy. So far as is known all forms now recognized are typically oviparous. No aquatic forms have been described.

KEY TO THAI SPECIES OF TYPHLOPS

1. No preocular; ocular touching second and third supralabials; 22 scalerows at middle of body; eyes hidden; blackish above, each scale with a yellow spot leaving dark longitudinal lines on body; relatively large, to length 480 mm.; transverse scalerows about 470.................*lineatus*

A preocular present touching second and third supralabials............ 2

2. A subocular present wedged between lower part of ocular and preocular; nasal completely divided; 18 scalerows about body; 520 transverse scalerows; length to 230 mm....................................*floweri*

No subocular present.. 3

3. 20 scales around middle of body................................ 4

More than 20 scales about middle of body......................... 6

4. Nasal suture arises from preocular; head more or less dark; normally nasal completely divided.. 5

Nasal suture arising from first or second labial; head, part of neck, and most of tail white; diameter of body in length, 40-60 times; transverse scalerows, 317; to 150 mm................................*albiceps*

5. Head-scales smaller; one pair parietals; diameter of body in total length, 30-45 times; 290-310 transverse scalerows; length to 180 mm. . .*braminus*

Head-scales larger; two pairs of parietals; diameter of body in total length, 28-43 times; transverse scalerows, 315-326; length to about 130 mm., *khoratensis*

6. A depression or pit under each upper head-scale; 24 scalerows; transverse scalerows 370; nasal incompletely divided; width in length about 30 times; no trace of eye visible; gray to ultramarine above, 13 ventral scale-

rows cream white; length 155 mm. . . . . *trangensis*
No depressions or pits under upper head-scales. 7

7. Black above, ivory-white below; scales in 28 (26) rows; transverse scalerows 384; length to 360 mm. . . . . *muelleri*
Not black above. 8

8. Brown to olive-brown above; gray-cream or brownish cream below; scales in 28 (26) rows; length to 430 mm. . . . . *diardi*
Grayish olive or brownish above; yellowish on venter; 22 scalerows; 368 transverse scalerows . . . . *siamensis*

Typhlops lineatus Boie

Typhlops lineatus Boie, Isis, 1827, p. 563 (type-locality, Java); Schlegel, Abbildungen neuer oder unvollständig bekannter Amphibien . . . 1844, p. 39, pl. 32, figs. 32-34;* Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 15 (Singapore, Penang, and Malacca, in Malaya; Java; East Indies); de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 4 (Sumatra, Nias, Borneo, Java); Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 102-103; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1915, p. 212; *ibid.* vol. 2, no. 2, Dec. 1916, p. 158 ("Bangnara, Patani" [= Narathiwat, Narathiwat]); Tweedie, The snakes of Malaya, 1954, p. 28 ("uncommon in Malaya").

Pilidion lineatum: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 897.

Typhlinalis lineatum: Gray, Catalogue of the specimens of lizards in the collection of the British Museum, 1845, p. 134.

Typhlina lineata: Günther, The reptiles of British India, 1864, p. 171, pl. 16, fig. B.

Diagnosis: Large species; snout rounded and strongly projecting; no preocular or subocular; ocular touching second and third labials; 22 scalerows around body; nasal not completely divided; eyes hidden; prefrontal, supraoculars, and frontal rather large, all transversely widened; blackish above, each scale with a yellow spot, or yellowish with dark brown longitudinal lines running between scalerows; head and venter yellowish white.

Description of species (from P. K. No. 110 near Bukit Besar, Na Pradoo, Pattani, southern Thailand): Snout rounded, strongly projecting, flattened on ventral surface. Rostral very broad, a little more than three fourths as wide as head; width of ventral portion of scale between nostrils nearly one half of greatest width of rostral; nasals large, not meeting behind rostral; nasal partially divided, suture running from first labial through nostril, and a very short distance beyond nostril; no preocular; an ocular scale behind nasal, but eye, completely invisible; four supralabials, three touch ocular, which is bordered posteriorly by two postoculars; prefrontal large, forming a straight transverse suture with rostral; frontal about half size of prefrontal; supraoculars transversely widened, nearly as large as prefrontal; parietals indistinctly differentiated.

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* Günther, *loc cit.* p. 171, considers Schlegel's figures "incorrect."

Scalerows: anteriorly, 24, at middle, 22; scales in a row from tip of lower jaw to end of tail, 470 ±; nine subcaudals, tail ending in a rounded plate bearing a small spine; scales preceding vent not clearly differentiated from adjoining scales; scales largely transparent, bearing a symmetrical microscopical grill over under-surface except where attached to body.

Color: Above light yellowish-brown with a series of ten dark lines from neck to tip of tail, the two outer consisting of a row of small dots, some occasionally being absent; entire ventral and ventrolateral surface uniform cream-white. Head light brown with some black flecks.

Measurement in mm.: Total length 473 ±; tail length, 8; width of body, 10; width of head, 7.

Variation: The species usually is reported as having only 22 scale rows, but whether counts are made other than at the middle of the body I cannot say. The uncertainty, as regards an accurate scale count and measurement of the specimen here reported is due to the broken condition of the specimen.

Boulenger, describing the color of a specimen, says that it is blackish above, each scale with a yellowish spot, the spots tending to form light lines of yellowish or pale brownish with dark longitudinal lines running between the series of scales; head and lower parts yellowish white.

The species is known to reach a length of 480 mm.

Remarks: I believe the specimen reported here to be the second found in Thailand. One specimen was taken some 45 years ago in the present province of Narathiwat. Outside Thailand the species is known in Malaya, Java, Borneo, and Sumatra. According to Tweedie (*loc. cit.* 1954) it is everywhere uncommon.

This specimen was obtained by Nai Prayoon Kananuracks, who has permitted me to study it.

Typhlops floweri Boulenger *in* Flower

Typhlops floweri Boulenger, *in* Flower, Proc. Zool. Soc. London, 1899, p. 654, pl. 37, fig. 2 (type-locality, "Siam"); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, Mar. 1915, p. 212; Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 21 (Bangkok); M. Smith, The fauna of British India including Ceylon and Burma . . ., Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, p. 46.

Diagnosis: A small snake with a projecting rounded snout; nostrils lateral; body, slender, elongate, diameter in length about 85 to 90 times; nasal completely divided; 18 longitudinal scalerows around body; rostral approximately three fifths width of head at level of eyes; no tail spine; nasals not touching behind rostral; a subocular present. Black or black-brown, tip of snout yellowish.

Description of species (from type B. M. No. 98.11.8.26, renumbered 1946.1.10.55): Head somewhat flattened, distinctly wider than deep; snout strongly projecting beyond mouth; rostral approximately three fifths as wide as head at eye-level, but not reaching as far back as level of eyes; nasal completely divided; prefrontal larger than frontal, broadly in contact with rostral; frontal and interparietal not as wide as parietals; preocular rather small, its suture with ocular passes over back edge of eye; eye for most part under ocular; suture with supraocular passes above eye; subocular* wedged between lower part of ocular and preocular; two postoculars; suture from nostril reaches second labial; 18 scalerows about body. About 520 transverse scalerows.

Color: Black or very dark black-brown, extreme tip of snout yellow; rostral and nasal scales light brown with minute yellowish dots; a yellow spot at vent.

Measurements in mm.: Total length, 228;** tail, 6.5; width of head, 2.5; width of body, 2.5; width in length, approximately 90 times.

Recently, in the British Museum, I re-examined the type of *Typhlops floweri.* My measurements show that the width of the rostral is greater (practically three fifths of the width of the head rather than "two fifths" reported by Boulenger). The rostral fails to reach back to the level of the eye. The prefrontal is larger than the frontal and broadly in contact with the rostral. The frontal and interparietal are not as wide as the parietals. The preocular is relatively small.

The presence of a subocular is not mentioned in the type description; and the figure given by Flower (1899) omits the subocular scale.

There are two specimens of *Typhlops floweri* in the U. S. National Museum. No. 72709, collected by Hugh M. Smith at Bangkok is a mutiliated specimen with part of the posterior part of the body missing; the rostral shows scattered glands which appear as small lights dots. The preanal scales are moderately enlarged.

The second specimen, No. 76163 was taken from the stomach of *Xenopeltis unicolor* captured at Bangkok. This specimen agrees with the type in lacking a pointed spine on the tip of the tail. Both of the above specimens agree with the type in having a subocular scale.

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* The figure given in Flower, *loc. cit.*, omits this scale.

** The original description gives the length as 210; the specimen is now somewhat elastic, hence the greater measurement.

I have the posterior portion of a species of *Typhlops* taken from the stomach of a serpent (*Cylindrophis rufus*) at Bangkok. The remains of the specimen offers a puzzle in identification. The tail lacks the terminal spine, but the scalerows on the body number 24. The color is black on the dorsal 12 rows and creamy white on the ventral 12 rows. The fragment measures about 85 mm.; the diameter of the body, 4 mm.; there is a small triangular depression behind the vent; the tail measures 3.3 mm.

Miss Alice Grandison of the British Museum has been kind enough to verify the presence of the subocular in the type specimen.

The precise type-locality is unknown.

Typhlops albiceps Boulenger

(Fig. 1)

Typhlops albiceps Boulenger, Ann. Mag. Nat. Hist., ser. 7, vol. 1, Feb. 1898, p. 124 (type-locality, Chantabun [=Chanthaburi], SE Thailand); Flower, Proc. Zool. Soc. London, 1899, p. 654, pl. 37, fig. 1 ("Siam"); Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 103 (Larut Hills, Perak, Malaya); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, Mar. 1915, p. 212 (Siam); The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 48-49 (Bangkok, Chanthaburi, San Kampeng Mts., in Thailand; Burma; Malaya).

?*Typhlops malaisei* Rendahl, K. Sven. Vet. Akad. Stockholm, vol. 29A, no. 10, 1937, p. 11 (type-locality, Dwana Hills, Burma).

Diagnosis: Snout rounded; nostrils lateral; no subocular, the ocular touching third and fourth labials; 20 scalerows around body; width of rostral one third to two fifths width of head; nasal suture arises from second labial. Head, neck, tail, and anal region white.

Description of species (from No. 1383, Na Pradoo, Pattani province): Snout projecting, rounded in lateral profile, truncate seen from above, and very indefinitely notched at rostral sutures; rostral narrowed anteriorly, widening above on snout to about two fifths of width of head; eyes not visible; nasal divided completely on left side (injured on right side); nasals not in contact behind rostral, separated by prefrontal; frontal slightly wider than prefrontal or interparietal; supraoculars smaller than parietals; preocular a little wider but nearly equal in height to ocular; one postocular; four supralabials, last largest, touching postocular; suture of nasal arises from second supralabial. No subocular.

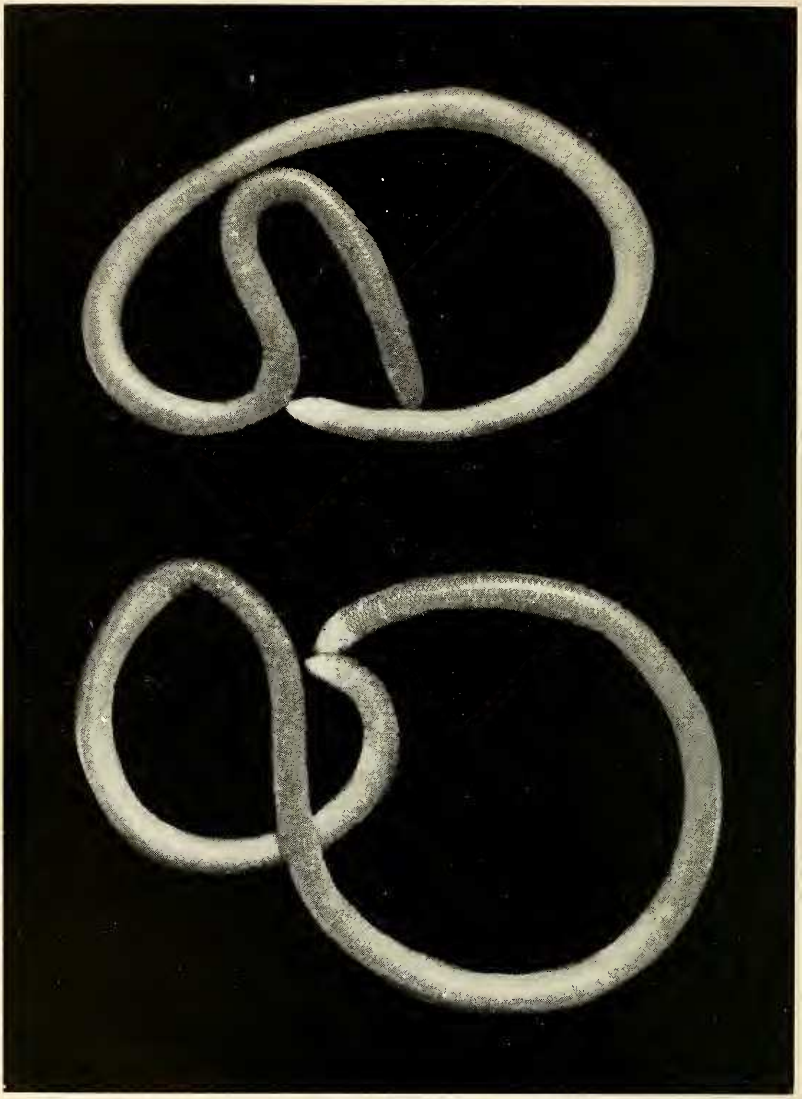

FIG. 1. *Typhlops albiceps* Boulenger. Upper figure, B. M. No. 1900.6.14.13. Actual total length, 164 mm. Lower figure, B. M. No. 1900.6.14.14. Actual total length, 183 mm. Both from Larut Hills (3500 ft.), Malaya.

Twenty longitudinal scalerows around body from head to tail. Diameter of body in total length (*circa*) 39 times; tail ending in a spinous point.

Color in life: Head and anterior part of neck white; tongue white; tail white above for almost its entire length; body normally brown above but now grayish (probably nearly ready to shed skin); six to eight scalerows on ventral surface cream-white, adjoining one on each side partly brown, partly cream-white.

Measurements in mm.: Total length, 143 mm.; tail, 3; snout to vent, 140; width of head, 2.6; width of body, 3.7.

Variation: The suture of the nasal may arise from the first or second labial (*fide* M. Smith, 1943). The eye normally is dimly visible. The diameter of the body may be contained approximately 40 times in total length. Smith also refers to this species a specimen having a length of 255 mm., and a body diameter of 5 mm. This is from an unknown locality in Indo-China and the reference may be doubtful. Boulenger originally stated that 18 scalerows were present. Malcolm Smith has shown that 20 is the correct number in the type.

Distribution: This is a rare snake in Thailand. It has been taken in Bangkok, Chanthaburi, San Kampeng Mts., and Pattani. Elsewhere it has been reported in the Larut Hills of Perak, Malaya, and the Dwana Hills, Burma.

Remarks: M. Smith has perhaps correctly placed Rendahl's *Typhlops malaisei* in the synonymy of *albiceps,* but he has not seen the type.

I have examined the British Museum specimens, Nos. 1900.6.19.13 and 14, from the Larut Hills (3500 ft.), collected by A. L. Butler. These agree reasonably well with the type-description. The eye is dimly visible. There are 20 longitudinal scalerows in each. The transverse scalerows of the first are 317 of which 12 are caudals. The supraoculars and parietals are of about same size. The first of the two measures, 166 mm., the tail 4 mm., the second specimen measures 179 mm., the tail, 12 mm. (!) which is a remarkable length, and there are 25 transverse rows on tail. The nasal is not completely divided, the suture terminating at the second supralabial. A Bangkok specimen has a length of 194 mm., the tail; 2.5 mm. This specimen was collected by Stanley Flower (B. M. No. 98.11.8.25). In this the prefrontal is twice size of frontal. A slight depression, present behind the eyes, may be anomalous.

A specimen from Hong Kong has been referred to this species. It has a total length of 222 mm., a tail length of 3.2. There are 411 transverse scalerows, 12 of which are caudal. This variation of nearly 96 transverse rows suggest the wisdom of reconsidering the identity of this last specimen.

The type in the British Museum bears the numbers 97.10.8.17 and 1946.1.10.50. It measures 128 mm., the tail 2 mm.

Typhlops braminus (Daudin)

Eryx braminus Daudin, Histoire naturelle des reptiles, vol. 7, 1803, p. 279 (based on plate 43, Russell's Indian Serpents, vol. 1, p. 48; type-locality, Vizagapatam, India).

Typhlops braminus Cuvier, Règne animal, 2nd Ed., vol. 2, 1829, p. 73; Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 236; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, 1914, p. 8; *ibid.*, vol. 1, no. 3, 1915, p. 212; The fauna of British India, including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 46-48 fig. 14.

Unless one can examine the materials on which many of the references to *braminus* are based, it is impossible to present a correct synonymy. It is most probable that other species, because of small size and the concommitant difficulty of discerning and counting scales, have caused considerable confusion by being placed in the synonomy of *braminus*-species that should be regarded as distinct.

It is uncertain as to what part of the Oriental Region was the original home of this species. It has doubtless been carried by man through accidental means throughout much of the present wide range. One may postulate that it reached Acapulco, Mexico on Spanish galleons from the Philippines. I have traced the species 40 km. north of Acapulco, Mexico along the highway but it has been taken at least one other place in Mexico. If one were seeking a specific method for this transportation one might suspect potted plants and the suckers of bananas as the most probable means.

Diagnosis: Snout rounded, nostrils lateral; no subocular, the ocular touching third and fourth supralabials; a small species (170 mm.) with numerous glandules visible through the scutes of head; nasal divided, suture from nostril terminating at preocular; eye distinct, prefrontal touches rostral; 20 scalerows about body; diameter of body 30-45 times in total length; transverse scalerows 290-320 (*fide* M. Smith, 1943).

Description of species (from No. 34254, Muak Lek, Sara Buri province): Snout projecting beyond mouth, rounded in lateral profile, somewhat truncate seen from above; nostrils not visible from above; rostral narrowed on underside of snout, widening above so as to equal little more than one fourth width of head, reaching back to anterior level of eyes, forming a broad suture with prefrontal thus separating nasals; later scales completely divided, suture from nostril terminating at preocular; prefrontal and frontal of equal size; interparietal likewise as large as two preceding scales, flanked laterally by two equal-sized parietals on each side; supraoculars somewhat diagonal, the suture with ocular crosses eye; four supralabials; preocular touches only third and fourth labials; scales in 20 rows, subequal in size; tail terminating in a spine on level with subcaudals; vent bordered anteriorly by five scales, two outer largest, median smallest; transverse scalerows to tail tip, 310.

Table of data on *Typhlops braminus*

LOCALITY	Bangkok	Bangkok	Chon Buri Bang Saen	Patthalung	Udon Thani
Number	33541	33546	34254	34697	34976
Total length	162	162	138	163	134
Width of body	4.9	4.85	4.5	3.8	3.65
Width in length	31	31	30	43	36.7
Transverse scalerows	327	332	312	310	312

Variation: Specimens taken at Hua Hin, Prachuap Khiri Khan were considerably darker in color, with slenderer bodies and somewhat less white coloration about the underside of the snout. The scales are smaller and there is seemingly a better defined separation of head and neck. A specimen showing this same variation was taken at Songkhla while two specimens from Phatthalung are similar to specimens in northern Thailand. The counts of transverse scalerows vary in Thai material from 300 to 332.

Distribution: I have taken specimens in the provinces of Udon Thani, Chon Buri, Sara Buri, Prachuap Khiri Khan, Phattahalung, Songkhla, and in Bangkok.

The species probably occurs in all of the Thai provinces. It is most likely to be confused in Thailand with the species herein described as *Typhlops khoratensis.*

Typhlops khoratensis Taylor

(Fig. 2)

Typhlops khoratensis Taylor, Univ. Kansas Sci. Bull., vol. 40, 1962, pp. 248-251, fig. 13a (type-locality, Muak Lek, Friendship Highway, Sara Buri province; Thailand).

Diagnosis: Body-width in total length approximately 28-43 times; rostral about one-third as wide as head at eye-level, failing to reach level of eyes; supralabials and infralabials relatively large; nasal completely divided, the suture from preocular; two pairs of parietals differentiated; prefrontal, frontal and interparietal relatively large, subequal; 20 scalerows throughout body; transverse scalerows approximately 315 to 326.

Description of type: Rostral short, about one third as wide as head, failing to reach eye-level by a considerable distance; nasals completely divided, the suture arising from preocular; upper nasals not in contact behind rostral; prefrontal relatively large, as large as frontal or interparietal; supraocular only slightly smaller than frontal, its suture with ocular crosses eye; two pairs of parietals; preocular smaller than ocular, suture between them not crossing eye; eye only

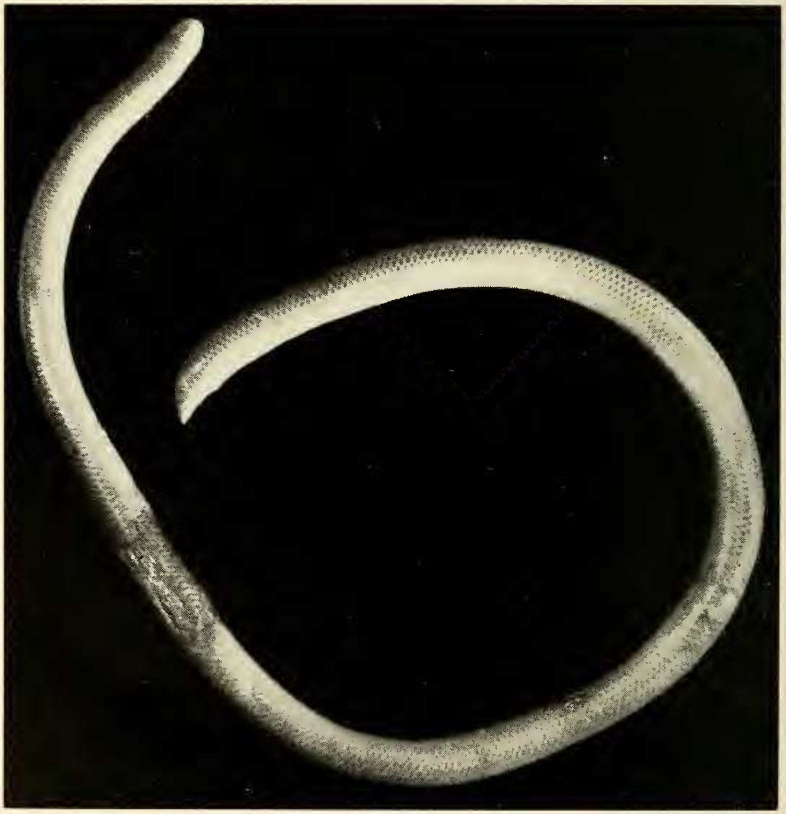

FIG. 2. *Typhlops khoratensis* Taylor. No. M. 268, paratype. Chiang Mai, Chiang Mai, Thailand. Actual total length, 107 mm. (The dark mark is due to an injury.) From Taylor, Univ. Kansas Sci. Bull., vol. 43, 1962, p. 249, fig. 13a.

dimly visible; supralabials relatively large and distinct, especially fourth; a single postocular behind ocular between fourth labial and parietal; ocular and preocular relatively small, the preocular largest; infralabials relatively large.

Scales in 20 rows along entire body; transverse scalerows about 315.[*]

Color: Nearly uniform gray, the scales about mouth and underside of snout whitish.

Measurements and data of type and paratypes of *Typhlops koratensis.*

NUMBER	3183	267	268	612	W. 291	W. 292	33325
Length, snout to vent	125	103	105	104	119.7	118	100
Tail	3	2	2	2	2.3	3	2
Total length	128	105	107	106	122	121	102
Scalerows at:							
neck	20	20	20	20	20	20	20
middle of body	20	20	20	20	20	20	20
before tail	20	20	20	20	20	20	20
Transverse scalerows	315	320	326	319	321	319	331
Width of head	2.8	2.45	2.5	2.5	2.9	2.8	2.3
Width of rostral	0.75	0.7	0.7	0.7	0.7	0.7	0.6
Rostral reaches eye-level	no	no	no	no	no	no	no
Body-width	3	2.8	2.4	2.5	3.6	4	3
Width in length	41.5	37	43.7	40	33	28	33
Nasal divided	yes	yes	yes	yes	yes	yes	yes
Suture from preocular	yes	yes	yes	yes	yes	yes	yes
Parietals two pairs	yes	yes	yes	yes	yes	yes	yes

Remarks: This species occurs with and resembles *Typhlops braminus*, especially specimens when they develop a grayish to a silvery gray color before shedding. The character of the headscales easily separates them and in the case of *T. braminus* the presence of distinct glands following along the head sutures is distinctive.

The two specimens from the Vienna Museum kindly loaned by Dr. J. Eiselt, without certain locality data, are probably from Laos or Thailand. The data were lost in movement of the collections during the war.

The species is named for the Khorat Plateau area of central (eastern) Thailand.

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[*] The scales are counted in a row; occasionally there are intercalated scales or the row is incomplete hence the counts are close approximations.

Typhlops trangensis Taylor

(Fig. 3)

Typhlops trangensis Taylor, Univ. Kansas Sci. Bull., vol. 43, 1962, pp. 251-253, fig. 14 (type-locality, Khao Chong, Trang).

Diagnosis: A short (155 mm.), relatively thick-bodied species, width in length approximately 30 times; 370 transverse scalerows from rostral to tail spine. Vertebrae, 206; nasal incompletely divided, suture reaching to second labial; 24 longitudinal scalerows; rostral, nasals, oculars, preoculars, prefrontal, frontal, supraoculars, parietals, and perhaps also interparietal cover distinct pits or depressions visible through posterior part of each scale; no trace of eye visible; gray to ultramarine above (11 rows); 13 ventral rows cream-white, the dividing line rather sharply marked.

Description of Species: A short thick-bodied species; tail ending in a spine, and bending down at tip so that terminal spine is on a level with venter; snout rounded, seen from above, equally as wide as body; head width, 5 millimeters; greatest dorsal width of rostral 1.65 mm. about one third width of head; rostral forming a suture with prefrontal; a suture, partly dividing nasal, ends at second labial, scarcely passing beyond nostril above; prefrontal smaller than frontal; frontal about as large as supraoculars; interparietal a little larger than frontal and notched mesially on posterior border, a little wider than parietals but slightly shorter; preocular, about size of ocular, wedged between second and third supralabials; ocular, without trace of eye, wedged between third and fourth supralabials, and bordered posteriorly by two postoculars and partly by parietal; four supralabials; snout projecting 1.4 mm. beyond snout; scales in 24 rows, anterior median rows largest; vent bordered by five scales, two outer largest; 370 transverse scalerows counted along dorsal mid-line to spine on tail; (about eleven rows on tail); vertebrae, 206, terminal four or five very small; tail broader than long; a gland under ventral section of nasal; most dorsal head scales cover pits.

Color in life: Ultramarine on eleven dorsal scalerows; lower 13 scalerows cream-white; dorsal head-scales lighter than body, the pits showing a little darker; underside of head cream-white.

Measurements in mm.: Total length, 155; body-width, 5.1; tail-length, 2.8; tail-length in total length about 55 times; body-width in total length, about 30 times.

Remarks: The relationship of the species is not known; the larger size of the dorsal head scales and the pits appear to separate this

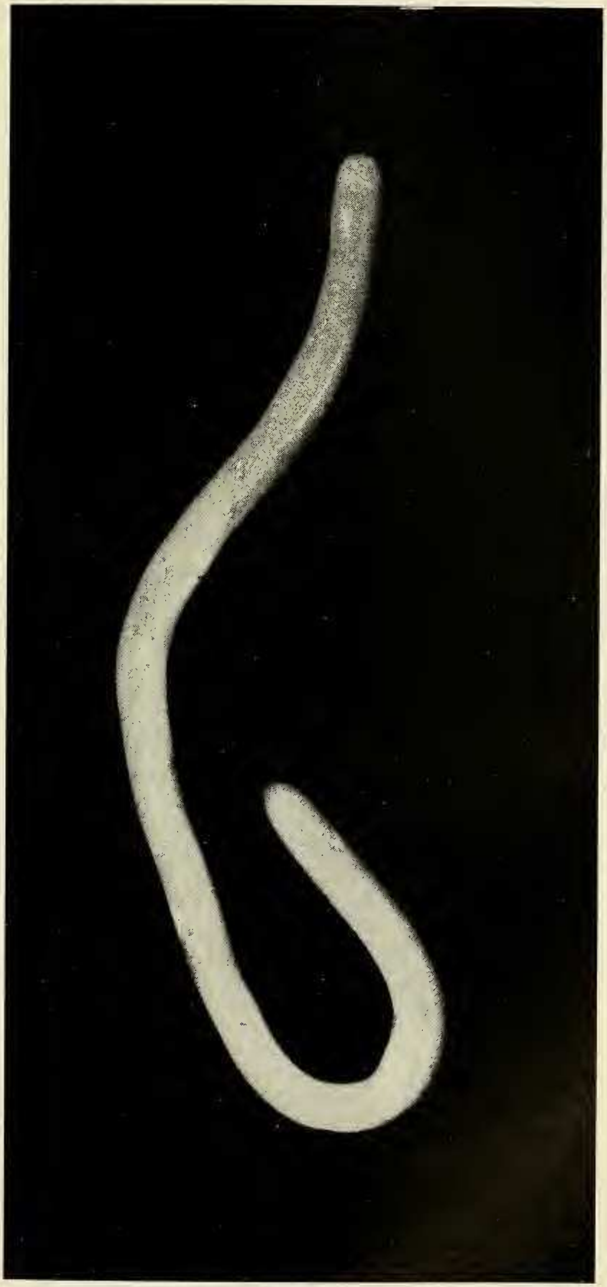

FIG. 3. *Typhlops trangensis* Taylor. Type. EHT-HMS No. 35754, from Khao Chong Forest Experiment Station, Trang province, Thailand. Actual total length, 155 mm. (From Taylor, Univ. Kansas Sci. Bull., vol. 43, 1962, p. 252, fig. 14.)

species very distinctly from other members of the genus occurring in Thailand. The pits are a significant feature and show with reasonable clarity in the photograph reproduced here.

The specimen was found under a rotting log about 30 meters from the shelter house at the first waterfall at the Khao Chong Forest Experiment Station, Trang province. The species is named for the province (Changwat) of Trang.

Typhlops diardi Schlegel

(Fig. 4)

Typhlops diardi Schlegel, Abbildungen neuer oder unvolständing bekannter Amphibiens 1839, p. 39 (type-locality said to be Cochin China); Duméril and Bibron, Erpétologie générale . . . vol. 6, 1844, p. 300 (state that type-locality is unknown); Malcolm Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 51-52, fig. 15 (*part.*); Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1125-1126.

I cannot accept the synonymy proposed by Dr. Smith *loc. cit.* and do not reproduce it here. Moreover I am not wholly certain that the species here described actually is a member of the above species. Two other forms have been described from Thailand and it could well belong to one of them (see Remarks). It is a puzzle I cannot solve at the present time.

The treatment by various authors* of the snakes of the *diardi* "group" has varied greatly.

A brief history follows: The first two forms of the group were described by Schlegel in 1839, *Typhlops diardi* from? Cochin China, and *muelleri* from Sumatra. Duméril and Bibron in their Erpétologie générale (1844) recognized Schlegel's species and described a third, *nigroalbus,* from Sumatra. Gray (1845) described *horsfieldii* under the genus *Argyrophis,* from the Khasi Hills, Assam, and *bicolor* from Singapore. Peters (1861) described *striolatus* from Calcutta, India, and Jan (1864) described *schneideri* from Bangkok, Thailand.

Günther (1864) treating of the fauna of India, recognizes *striolatus, nigroalbus,* and *horsfieldii* and describes a new species *siamensis* from Thailand. Gray's *bicolor* is placed in the synonymy of *nigroalbus* and Schlegel's *diardi* the oldest name is made a synonym of *horsfieldii!* Stoliczka (1872) described *barmanus* from Moulmeim, Burma.

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* Gray (1845), Cat. Liz. Brit. Mus., pp. 136-137; Peters (1861), Monatsb. Akad. Wiss. Berlin, p. 922; Jan in Jan and Sordelli (1864), Iconographie générale des ophidiens, livr. 9, pl. 1, fig. 3; Günther (1864), The fauna of British India, p. 175, pl. 15, fig. D; Stoliczka (1872), Proc. Asiat. Soc. Bengal, p. 144; Wall (1908), J. Bombay Nat. Hist. Soc., col. 18, p. 314; *idem, ibid.*, vol. 19, 1909, p. 609.

In the first volume of the Catalogue of snakes of the British Museum which appeared in 1893, Boulenger recognized *diardi* (considering *horsfieldii, barmanus,* and *striolatus* as synonyms), *siamensis, müller, schneideri,* and *nigroalbus* (with *bicolor* a synonym). Wall described *tephrosoma* in 1908, and *cinereus* in 1909.

Malcolm Smith in The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes (1943) has reduced this group of nominal forms to a single species, *diardi,* recognizing two subspecies, *diardi* and *muelleri.*

The material that I have been able to examine would appear to consist of more than a single species and shows certainly that a review of this whole group is most seriously needed.

If we accept this wholesale synonymizing, we have a burrowing snake with an amazingly wide range, extending as it does from Bengal, Sikkim and Assam, east through Burma, Thailand, and Indo-China, south through Malaya to Sumatra, Nias, and Borneo—this too a snake quite unlikely to be transported to far places by man.

As to the characters of this remarkable species, the following variation must be noted: Scalerows from 22 to 30; dorsal head scales small or dorsal head scales large; the rostral scale one half, one third (or less) two thirds (or more) of the width of the head; eyes visible or eyes invisible; coloration brown above and yellow below, black above and gray-white below, dark brown above, light brown below; head dark black or brown, the scales above showing some lighter markings; or head to behind eyes uniform yellow; the rostral reaching to or even behind eye-level or failing considerably to reach back to eye level, and finally and not least of variation, transverse scalerows varying between 260 and 414.

Surely to accept this as proper taxonomic treatment of these forms is to break down our concept of species in the family Typhlopidae, since as many as three of these forms may occur in a single area. This technique applied to other groups of *Typhlops* could reduce (just as erroneously) the total number of species very materially, thus benefiting those who would hold to the idea that the end of taxonomy is to provide labels (and as few as possible) for specimen jars on museum shelves, and that evolution is an interesting theory.

Diagnosis: Large, *Typhlops* reaching a length of over 400 mm.; snout rounded, projecting; tail ending in a pointed spine directed downwards; a preocular present; no subocular; head not yellow; rostral reaching level of eyes, which are distinctly visible; longitudinal scalerows, 26, (24)*; transverse scalerows 324.

Description of species (from KUMNH No. 31436, "Korat" Thailand): Head relatively narrow; width of rostral (greatest) 3 mm.; greatest width of head, 7.2; rostral not reaching level of eyes by about .7 mm.; nasal partially divided with the suture arising from second labial, passing through nostril and traversing half distance between nostril and rostral scale; nasals touch at posterior edge of rostral; prefrontal enlarged broadly in contact with frontal which is a little wider but scarcely as long; interparietal in contact with frontal, but a little shorter; supraoculars diagonal, enlarged, separated mesially, not touching eye; parietals larger, at least transversely greater than supraocular; a large preocular, distinctly smaller than ocular, its posterior border notched, not crossing eye; narrower and less high than ocular; eye distinct; two small postoculars between parietal and fourth labial; four supralabials. Tail with a terminal spine directed downward. Scale-formula: 26, 26, 22. The scales shiny smooth, but showing under the free edges a minute "crisscrossing" grillwork; scales from rostral to above vent 305; vent to spine 8; or a total of 313.

Color: On neck and anterior part of body nine dorsal scalerows dark brown the upper edges of adjoining rows showing some pigment. This increases and much before middle of body is reached there are eleven dark-brown rows; anteriorly there are 17 and posteriorly 15 ventral rows without dark pigment, having a brownish cream color, with a suggestion of a salmon tinge; a dark indefinite mark with two arms projecting forward on rostral; other head scales show dark and light marbling, the dark predominating; the scales show lighter marks, not on scale-edges but actually below the scale forming a very narrow reticulum; anteriorly there is a distinct single straight transverse lighter line visible.

Measurments in mm.: Total length, 332; tail, 4.5; width of head 7.2; length of head, 11; width of body at middle, 11 mm.

Remarks: There have been two Thai species described; one from Bangkok, *Typhlops schneideri* by Jan and *T. siamensis* described by Günther from "Siam." This latter species is characterized by 22 scalerows and 368 transverse scale series. The upper and lateral parts are described as "uniform greyish olive, the lower yellowish."

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* Duméril and Bibron, who studied the type, record 36 scalerows for the type (doubtless a misprint, intended for 26) and give for the number of transverse rows—324 for body, 8 for the tail, total, 332.

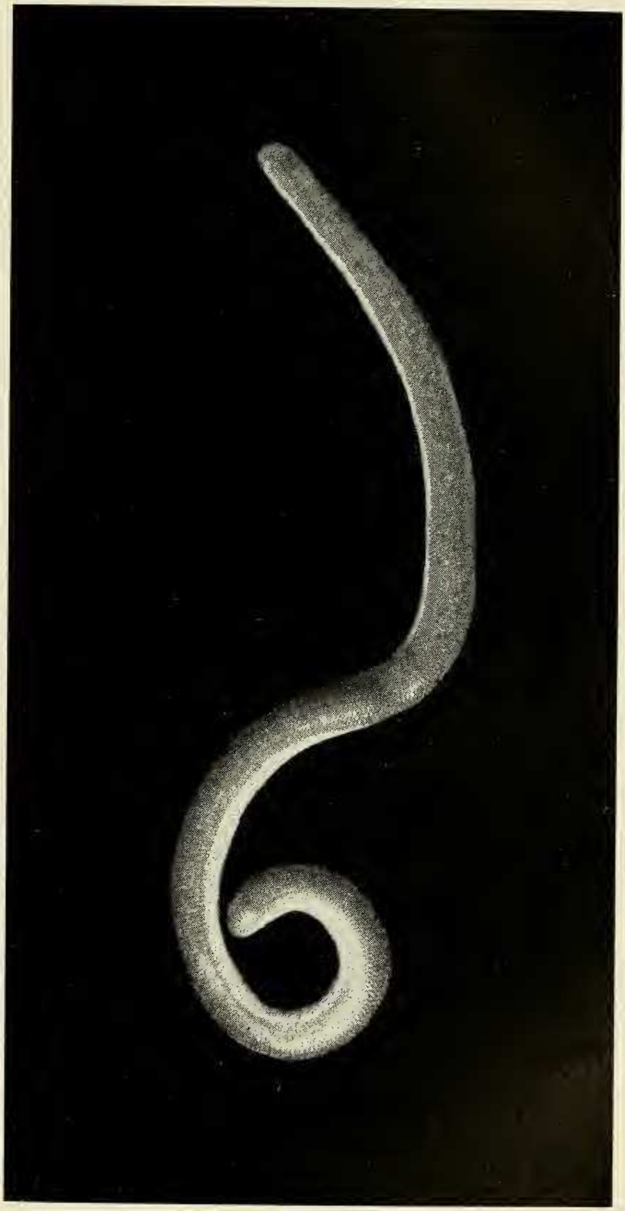

FIG. 4. *Typhlops diardi* Schlegel. EHT-HMS No. M177, from near Kuala Lumpur, Malaya. Actual total length, 300 mm.

This I believe certainly represents a distinct species. Boulenger, who may have seen the type of *schneideri,* reports 26 scalerows around middle of body; eyes hidden; total length 230 mm.

I have at hand also two forms from Malaya whose identities are in doubt. One has a white head, the rostral more than half width of the head but failing to reach level of eyes by 0.8 millimeter; eyes moderately distinct; the parietals much smaller than the supraoculars. Scales in 28 rows with 398 transverse scalerows. The "grillwork" seemingly is not present on the scales; four postoculars.

Still another specimen has the head dark, the nasals narrowly separated behind rostral which is one third of the head-width, and reaching eye-level. The preocular is wider than the ocular, its border crossing the eye; two postoculars; supraoculars in contact minutely. The parietals are wider than the supraoculars. The prefrontal, frontal and interparietal are large; and there are 362 transverse scalerows. The "grillwork" on the scales is not evident.

Typhlops muelleri Schlegel

(Fig. 5)

Typhlops müllleri Schlegel, Abbildungen . . . amphibien, 1839, p. 39, pl. 32, figs. 25-28. (type-locality Padang, Sumatra); Duméril and Bibron,* Erpétologie générale . . . vol. 6, 1844, pp. 298-300; Jan and Sordelli, Iconographie génerale des ophidiens, livr. 4, p. 19, pl. 6, fig. 2, Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 238; Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 25 (*part.*).

Typhlops diardi mülleri: (*part.*) M .Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 51-52, fig.

Diagnosis: Large typhlops, black above, yellowish-white below; nasal scale not completely divided, the suture arising from second labial; rostral reaches back to eye-level; subcaudal scales 8-13; scale-formula: 26 (28), 26 (28), 22 (24) a preocular; no subocular; eyes distinct; tail ending in a spine.

Description of species (from No. 34558 Bhetong, Yala province, Thailand): Head somewhat flattened, rounded in profile and when seen from above projecting about three millimeters beyond mouth. Rostral widening on dorsal surface of head to 44 per cent of head-width between eyes, reaching level of line drawn between front edge of eyes; prefrontal reaching frontal at a point; nasals meeting at a point behind rostral, not completely divided, but nearly so; suture from nostril running to second labial; pit below

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* In a footnote Duméril and Bibron state: "M. Schlegel donne le nombre 22 pour les rangées longitudinales d'écailles et celui de 428 pour les rangées, transversales, nous, nous avons trouvé qu'il y a 28 des unes, et 402 des autres." Unfortunately in their own text in one place 23 is given as the number of scalerows, in still another place 28.

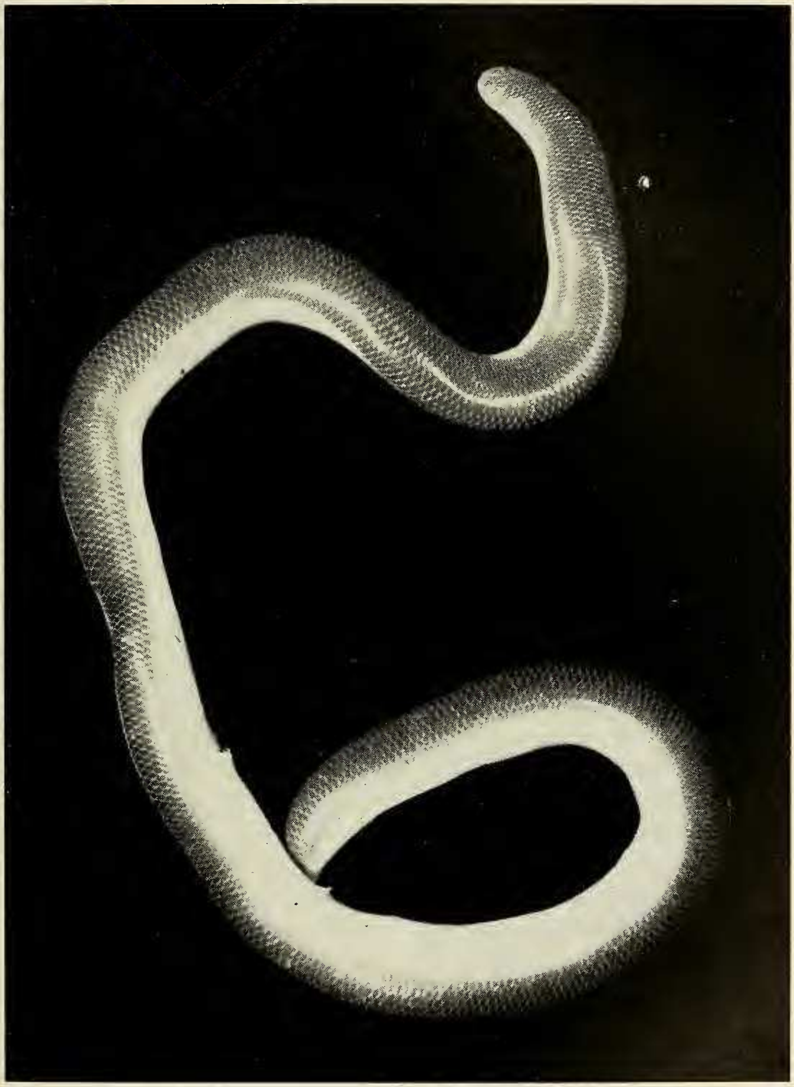

FIG. 5. *Typhlops muelleri* Schlegel. No. 34558, Bhetong, Yala, extreme southern Thailand. Actual total length, 355 mm.

nostril covered by nasal and scarcely visible externally; preocular reaching above eye and partly covering it, its back edge with a concavity at eye-level, its lower point between second and third labials; supraocular distinctly larger than frontal or parietal; ocular large, its lower edge between third and fourth supralabials; nostrils not visible directly from above.

Scales in 28 rows throughout most of body, reducing to 26 and 24 posteriorly near vent; scales smooth; 384 transverse scalerows from mental to tip of tail.

Color in life: Blackish above, nearly uniform, but each scale darker near its center, covering nine scalerows anteriorly, eleven posteriorly; pigment tending to cover outer rows; thus at mid-body 13 rows with pigment, outer row not uniformly covered; 15 rows low on sides and on venter cream-white; ventral and front part of head similarly colored; narrow light line borders rostral; subcaudals blackish with two whitish areas; terminal point of tail white.

Measurements in mm.: Greatest width of head, 8; width at eyes, 7; length of tail (vent to tip), 4; total length, 355; width of body at middle, 11; one centimeter in front of vent, 12.

Distribution: Specimens have been taken in Thailand only at Bhetong, Yala. Outside of Thailand the species is known certainly in Malaya, Singapore, and Sumatra.

Remarks: The type-specimen (data from Schlegel, and Duméril and Bibron) has 28 longitudinal scalerows, and 402 transverse rows.

This specimen likewise has 28 longitudinal scalerows but only 384 transverse rows. The specimens otherwise agree very well as to color.

Duméril and Bibron write: "Le Typhlops de Müller et le Typhlops noir-blanc [*Typhlops nigroalbus* described in the same work pp. 395-498] sont tellement voisin, l'un de l'autre que se n'est qu'apres un examen comparatif les minutieux que nous sommes arrivés à reconnoitre qu'ils appartiennent réellement à deux espèces distinctes." The longitudinal scalerows are 26 or 28; Transverse rows on body and tail approximately 326 + (8-12) a total of about 338. This species also is from Sumatra.

Typhlops siamensis Günther

Typhlops siamensis Günther, The fauna of British India, 1864, p. 175, pl. XVI, fig. D. (type-locality "Siam"); Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 24.

Typhlops diardi: M. Smith, The fauna of British India . . . Reptilia and and Amphibia, vol. 3, Serpentes, 1943, pp. 51-52, fig. (*part.*).

Diagnosis: Diameter of body in total length 33 times, 22 scalerows about body, nasal semidivided, suture from second supralabial.

Description of species (after Günther and Boulenger): Snout rounded and moderately projecting; eyes visible; nostrils lateral;

width of upper part of rostral less than one third of that of the head extending to level of eyes; the lower portion longer than broad; nasal not completely divided, suture from second labial; nasals not united behind rostral; preocular as large as ocular which extends nearly as far backwards as last labial; shields on crown of head subequal in size. The circumference at middle contained 13½ times in total length; length of tail less than width of head, the tail ending in a spine. Body with 22 scalerows; 368 transverse scalerows; diameter of body in total length, 33 times; grayish olive or brownish above; below yellowish.

Measurements in mm.: Total length, 166.

Remarks: The type specimen was collected by Mouhot in Siam, the exact locality unknown.

FAMILY ANILIIDAE M. Smith

Aniliidae M. Smith, The fauna of British India . . . vol. 3 Serpentes, 1943, p. 94.

Ilysiidae Boulenger, The fauna of British India . . . 1890, p. 249.

Diagnosis: Body generally cylindrical with uniform scales, ventrals not or but feebly enlarged. Bones of skull closely united. Dentary, articulare, coronoid, and splenial firmly united; quadrate vertical in position; parietals greatly elongated; premaxillary with or without teeth, touching nasal bone; prefrontal bones border nasals; hypapohpyses absent; vestiges of pelvis and legs present, latter terminating in a clawlike appendage lateral to vent.

Two genera occur in southeastern Asia, the Malay Peninsula, and the East Indies. One genus, *Cylindrophis,* is known to occur in Thailand. The other genus, *Anomalochilis,* has been found in Pahang in Malaya (two specimens of *A. leonardi*) and in Sumatra (two specimens of *A. weberi*). This genus may be looked for in southern Thailand. It may be recognized by the absence of the mental groove and the presence of leg remants. A third genus is known from northern South America.

Genus *Cylindrophis* Wagler

Cylindrophis Wagler, Icon. Amphib., 1828, p. 5; Natürliches System der Amphibien, 1830, p. 195 (type *C. resplendens*).

Diagnosis: Body cylindrical, of nearly equal diameter throughout; scales smooth, ventrals feeble enlarged, body scales small, imbricating, subequal; nasals in contact behind rostral; no loreal present; preocular absent. Nine to twelve teeth on maxilla; premaxilla without teeth.

Only a single species of *Cylindrophis* occurs in Thailand.

Cylindrophis rufus (Schlegel)

Tortrix rufa Schlegel, Abbildungen . . . Amphibien, 1844, p. 111, pl. 33, figs. 11-13 (type-locality, Java).

Two subspecies are recognized, *C. rufus rufus* and *C. rufus burmanus.* The first occurs in Thailand. They may be differentiated by number of scalerows, the first having 21 the latter 19. It is not unlikely that *burmanus* occurs also in Thailand. It should be looked for in the low mountains and lowlands along the western, Burmese border.

*Cylindrophis rufus rufus** Schlegel

(Figs. 6, 7)

Tortrix rufa Schlegel, Abbildungen . . . —Amphibien, 1844, p. 111, colored plate 33, figs. 11-17 (type-locality, Java).

Cylindrophis rufa: Gray, Zoological miscellany, 1842, p. 47.

Cylindrophis rufus: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 900; Günther, Reptiles of British India, 1864, p. 179; Boulenger, The fauna of British India, Ceylon and Burma, Reptilia and Batrachia, 1890, p. 250, fig.; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 135; Flower, Proc. Zool. Soc. London, 1899, p. 656, pl. 37, fig. 3; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1915, p. 212; Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 254; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 36-37; K. Schmidt, Copeia, 1928, p. 80; Bourret, Les serpents de l'Indo-chine, 1936, p. 24; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 96-98, fig. 28 (skull); Tweedie, The snakes of Malaya, 1954, pp. 28-29.

Diagnosis: A medium-sized snake, reaching a length of 865 mm.; scales in 21 rows, strongly iridescent; nasals in contact behind rostral; prefrontals larger than frontals; young with rings of white often interrupted on middorsal and mid-ventral lines, the dorsal marks disappearing largely or completely in old specimens; ventrals narrow.

Description of subspecies (from No. 36319, Bangkok, Thailand): Rostral higher than wide, pushing between nasals for half of their length; nasals rather small, forming a common suture behind rostral, nostril pierced in lower anterior part; prefrontals large, considerably broader than long, their common suture equal to about two thirds of their length, entering orbit broadly; frontal small, somewhat longer than wide, widest point on scute at anterior level of eyes; suproculars reach very close to anterior level of eyes; no loreal or preocular; a small postocular; temporals, 1 + 2 + 3; scale following parietals and temporals relatively large; six supralabials

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* *Anguis ruffa* Laurenti, Synopsis Reptilium, 1768, p. 71, type-locality "Surinam," is sometimes regarded a synonym of the species here considered. As this matter cannot be settled the next, certainly authentic name has been closen.

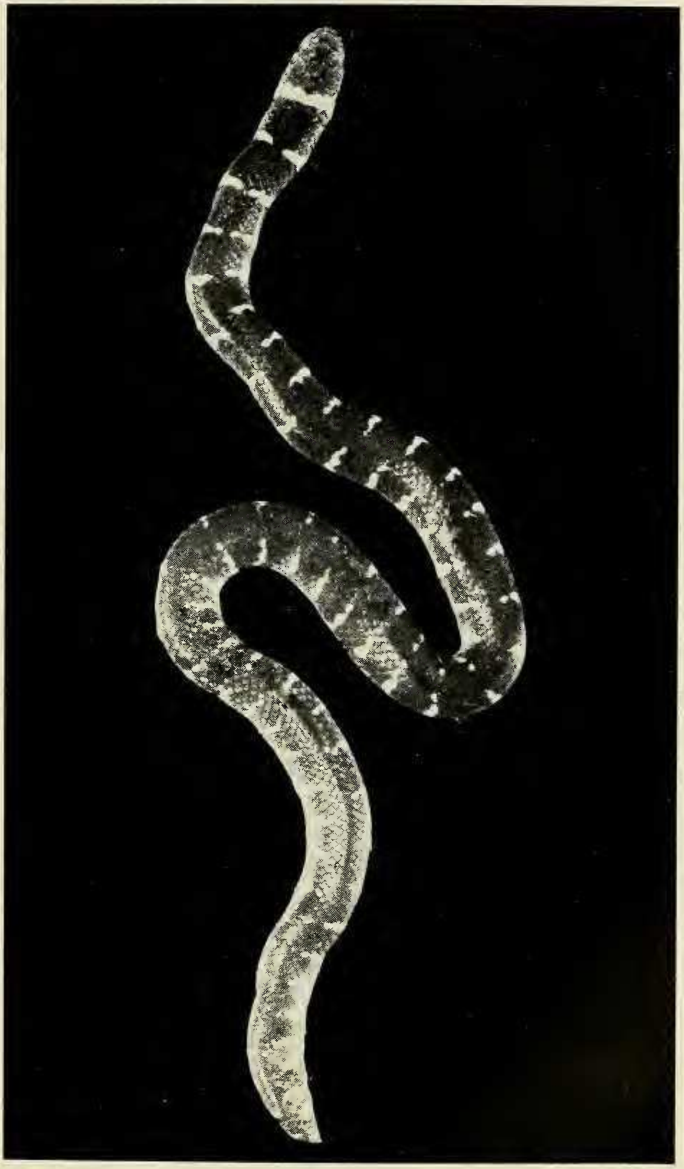

FIG. 6. *Cylindrophis rufus rufus* Schlegel. Young. No. 1656, Hotel Metropole grounds, Bangkok. Actual total length, 224 mm.; tail, 6 mm. (Collected by Vice Air Marshal, Nai Manob.)

third and fourth border orbit; six infralabials, first pair in contact behind small mental, first three border first pair of chinshields, which are a half larger than second pair; mental groove present. Scale-formula: 21, 21, 19, scales smooth without pits. Ventrals, 196 (to second pair of chinshields); subcaudals six, undivided; anal divided; eye small, its diameter less than its distance to lip.

Color in life: Above deep lavender-purple, skin between scales whitish; venter with approximately 48 gray-white bars extending slightly on sides, sometimes continuous across mid-line often broken on mid-line and alternating; underside of tail red with considerable darker pigment, except tip which is deep black.

Measurements in mm.: Total length, 793; tail, 18; width of head, 28; length of head, 35.

Variation: Variation recorded in literature for the present subspecies is as follows: The ventrals vary between 186 and 216, the subcaudals, from 5 to 7. There are 21 scalerows around the body except near the vent where the number is reduced to 17.

Young specimens have the whitish bars on the sides, (rarely meeting on middorsal line) clearly defined. As the snake grows older, pigment from the edges of the white scales begins to close in so that the light marks are rendered much darker, and finally the white is lost completely in old specimens.

Distribution: I have found several specimens on the grounds of Chulalongkorn University, and one specimen near Sara Buri in the province of the same name.

Outside of Thailand the species occurs in southern Indo-China, the Malay Peninsula and certain islands in the Indo-Australian Archipelago.

Remarks: Most of the specimens I have had available in this study are from Bangkok and environs. It must be regarded a common species of snake along the city waterways (klongs) and in gardens. It is subterranean in habit for the most part and is to be discovered ensconsed under boards, rocks, and other debris in the neighborhood of soft moist earth. It eats a variety of foods and is fond of other snakes.

FAMILY XENOPELTIDAE Cope

Xenopeltidae Cope, Proc. Acad. Nat. Sci. Philadelphia, 1864, p. 230.

Diagnosis: Body cylindrical. Scales smooth, imbricating; ventrals widened. Bones of skull well united; premaxillary bone touching maxillary, bearing well-developed teeth in line with maxillary

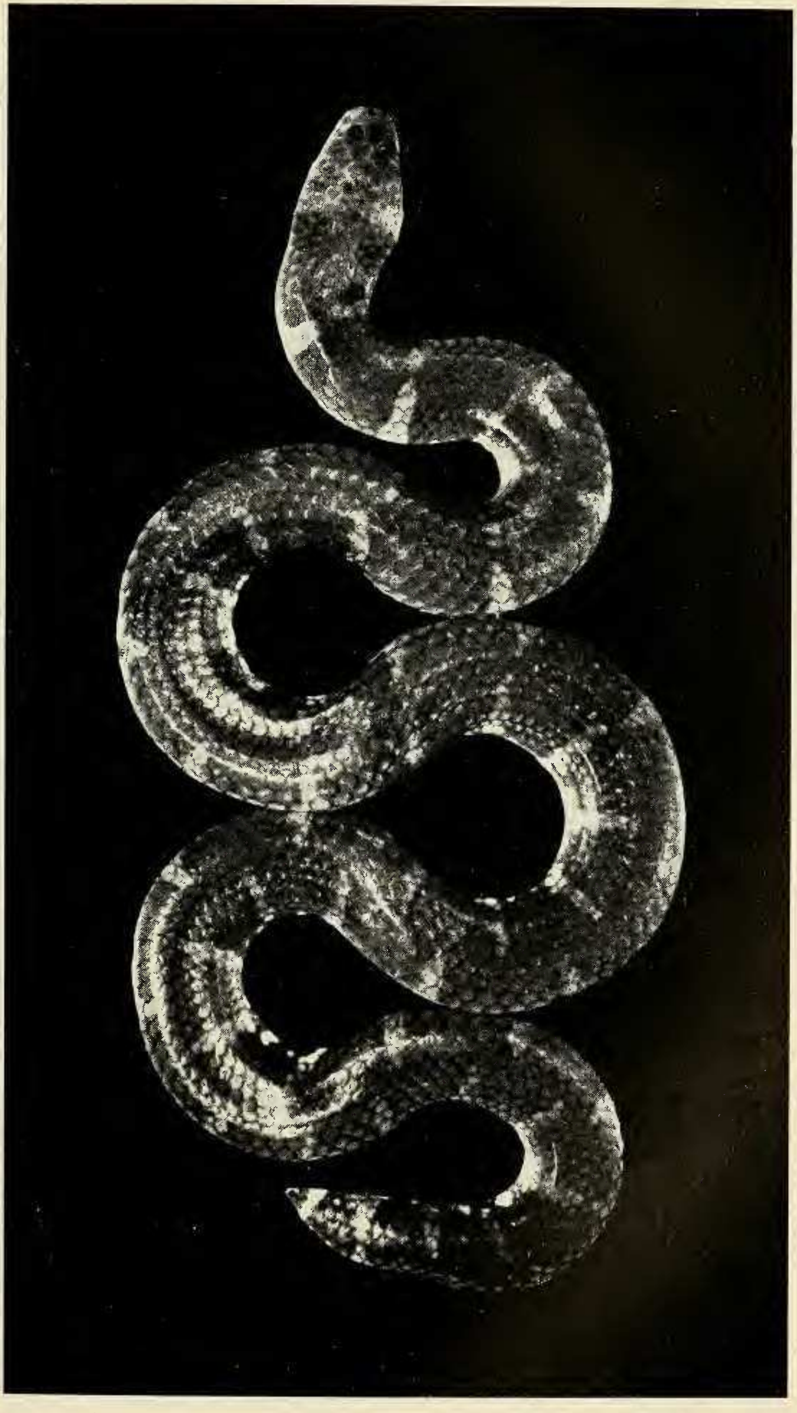

FIG. 7. *Cylindrophis rufus rufus* Schlegel. Adult. No. 33225, Campus Chulalongkorn University, Bangkok. Actual total length, 428 mm.; tail, 8 mm.

teeth; ectopterygoid loosely attached to maxilla; prefrontal sutured to nasal; dentary very loosely attached anteriorly to anterior end of articulare but free behind and movable; no coronoid; no postfrontal; a supratemporal supporting a short quadrate. Hypapophyses absent in posterior part of vertebral column.

A single genus, *Xenopeltis,* is known. There is a superficial resemblance between *Xenopeltis* and *Cylindrophis,* as for example, the rather stiff body; the union of skull bones; the presence of premaxillary teeth (in at least one form); the burrowing habit, and the shiny, strongly iridescent scales. The ear bones of the Xenopeltidae and Aniliidae too are similar, differing from those in other families of serpents. However the differences between the two families are equally as striking as similarities. One suspects that convergence, because of the burrowing habit, accounts for these similarities.

Genus *Xenopeltis* Reinwardt *in* Boie

Xenopeltis Reinwardt, *in* Boie, Isis, 1827, p. 564, (type of genus *X. unicolor*).

Diagnosis: Body cylindrical, head scarcely distinct from neck; eye small, pupil vertically elliptic; nasal divided; a large scale in front of eye that may be interpreted as a preocular, or a loreal, or a fusion of the two; scales smooth, in 15 rows throughout body; ventrals widened; subcaudals, except terminal, paired. Teeth numerous, 35-45 on maxilla, four or five on lateral areas of premaxillary; a group of enlarged scales lie behind parietals in occipital region.

Xenopeltis unicolor Reinwardt *in* Boie

(Fig. 8)

Xenopeltis unicolor Reinwardt *in* Boie, Isis, 1827, p. 564, (type-locality, Java); Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 904; Günther, The reptiles of British India, 1864, pp. 180-181; Theobald, Journ. Linn. Soc., Zoology, vol. 10, no. 41, 1868, p. 37; Journ. Asiat. Soc., extra number, 1868, p. 64; Boulenger, The fauna of British India, Ceylon and Burma, Reptilia and Batrachia, 1890, p. 276, fig. 85; Catalogue of the snakes in the British Museum, vol. 1, 1893, pp. 168-169, fig. 10; Flower, Proc. Zool. Soc. London, 1896, p. 878; *ibid.,* 1899, p. 657; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 113, figs. 35, 36; Wall, Journ. Bombay Nat. Hist. Soc., vol. 19, 1909, p. 292, pl. 10; *ibid.,* vol. 29, 1923, p. 361; *ibid.,* vol. 30, 1925, p. 806; Thompson, Proc. Zool. Soc. London, 1913, p. 415; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, 1914, p. 12; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 39-41, figs. 20, 21; Pope, Reptiles of China, 1935, pp. 77-78, pl. 5, H, I, and J; Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, pp. 299-300; Bourret, Les serpents de l'Indo-Chine, 1936, pp. 27-29, fig. 12; Mahendra, Current Sci. Bangalore, vol. 6, 1938, p. 559, fig.; M. Smith, The Fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 101-102, fig. 31.

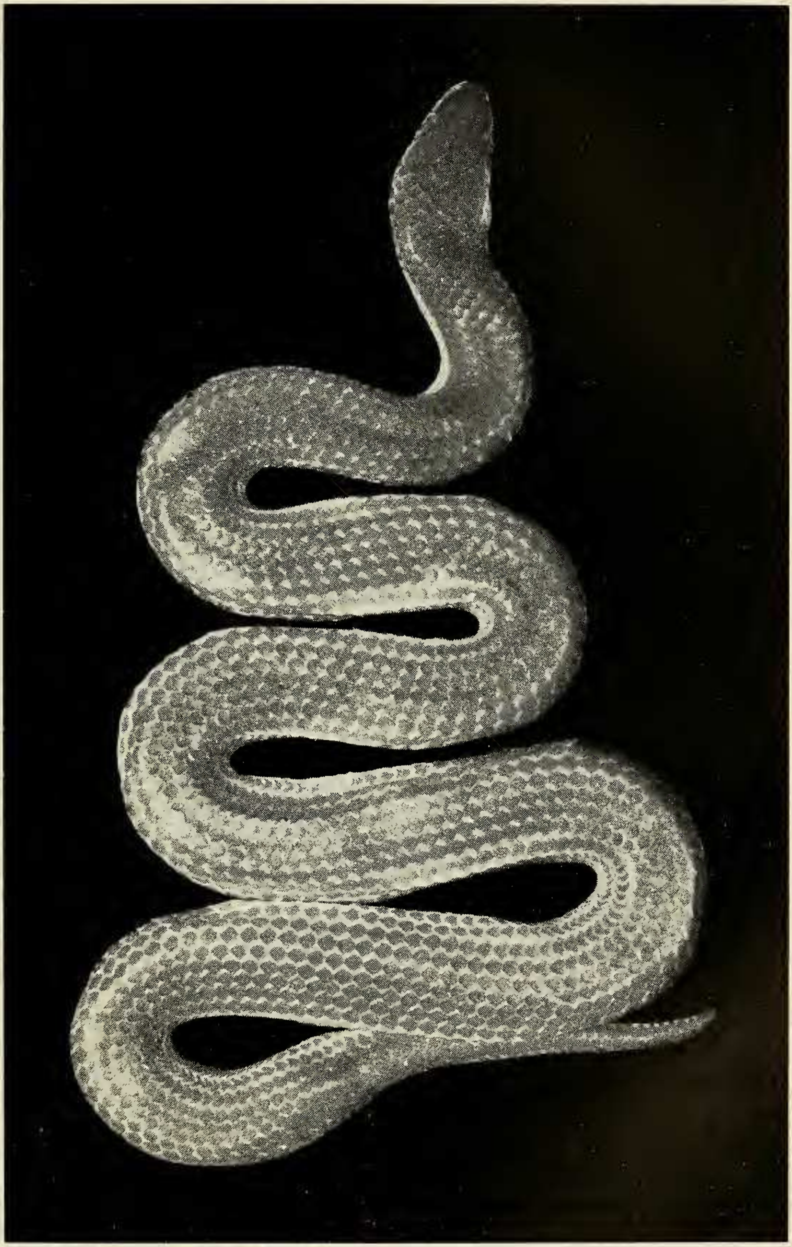

FIG. 8. *Xenopeltis unicolor* Reinwardt *in* Boie. No. 34235, Bang Saen, Chon Buri, southeastern Thailand. Actual total length, 597 mm.; tail, 63 mm.

Xenopeltis concolor Reinwardt *in* Boie, Isis, 1827, p. 564, (type-locality, Java).
Xenopeltis leucocephala Reinwardt *in* Boie, Isis, 1827, p. 564, (type-locality, Java).
Tortrix xenopeltis: Schlegel, Essai sur la physionomie des serpents, 1837, vol. 2, p. 20, pl. 1, figs. 8-10; and Abbildungen neuer oder unvolständig bekannter Amphibien, 1844, pl. 35, (substitute name).

Diagnosis: Characters of family and genus (see preceding).

Description of species (from No. 664, Hua Hin, Prachuap Khiri Khan): Body generally cylindrical; head much flattened, somewhat wedge-shaped; rostral a little wider than high, visible above as a triangular area; internasals small, deceptively appearing to border nostril which lies between the two nasals; prefrontals large, one on right side smaller than that on left, its posterior end narrowed to less than half width of the other scale; frontal longer than wide, shorter than its distance from tip of snout, about as long as parietals which are widely separated posteriorly by a large azygous occipital scale that is only a little smaller than frontal and in contact with it; a pair of enlarged scutes border occipital laterally; single scale immediately following occipital much larger than body scales; nasal divided, posterior part the longer; a large scale between posterior nasal and eye may be interpreted as a large loreal, as a preocular, or as a fusion of two scales; it borders the orbit, touching frontal and supraorbital; two postoculars, upper larger than supraocular; temporals, 2 + 3; supralabials, eight, anterior nasal wedged between first two, fourth and fifth border orbit; eight infralabials, first three touching first pair of chinshields which are smaller than first labials; no second pair of chinshields.

Scales smooth in 15 rows throughout body, seven dorsal rows subequal, outer rows growing larger, that bordering ventrals slightly the largest. Ventrals, 177; anals, 2; subcaudals, 32, first and last undivided.

Color in life: Head, uniform purple above, lips light with some brownish clouding; body generally purplish, edges of scales somewhat lighter; this lighter color becoming more obvious low on sides, where scale-edges are whitish cream on three lateral rows, leaving rows of purplish-lavender spots; outermost scalerow on each side with a transverse dash of lavender color; chin, throat, and venter generally cream-white; ventrals on posterior part of body with a few small, rather indistinct lavender marks, each subcaudal scale being half lavender, half cream.

Measurements in mm. (ANSP Nos. 19886 and 664): Total length, 964, 690; tail, 84, 70; width of head, 25, 19; length of head, 38, 28.2.

Variation: The ventrals vary from 173 to 196; the subcaudals from 24 to 31.

Distribution: In Thailand the species is widespread. I have taken specimens in Chiang Mai, Sara Buri, Chon Buri, and Prachuap Khiri Khan provinces, and also in Bangkok.

Outside of Thailand the species is known in Burma, Kwangtung province in China, Indo-China, Malaya, and the Indo-Australian Archipelago as far as Palawan in The Philippines, and Celebes.

Remarks: The specimen described was taken from under a small pile of dried grass on the golfcourse at Hua Hin, Prachuap Khiri Khan. An examination of its stomach contents showed that it had recently eaten. I identified a *Riopa bowringi,* a *Lygosoma quadrupes,* two *Ophioscincus anguinoides,* and a very young *Oligodon taeniatus,* all of which species were taken by me in the same general area.

Specimens taken elsewhere have been found usually under logs or debris, and usually just under the surface of the loose earth. The largest specimen I have studied measured 964 millimeters in length. Asymmetry in the prefrontals is not uncommon. M. Smith (1943, fig. 31) depicts this condition.

The Thai name, in reference to its strong iridescence, is "sunray-snake." The serpent is a gentle creature seemingly unwilling to use its bite for defense.

FAMILY BOIDAE Gray

This family, having world-wide distribution in the tropics, is represented in southeastern Asia by three species all belonging to the genus *Python.* The family comprises the largest of the living snakes; but there is perhaps some uncertainty as to whether the Asiatic pythons exceed the South American anacondas in length and weight.

A specimen of *Python reticulatus* has been recorded by Wall as reaching a length of 28 feet, with a weight of 250 lbs.; and a specimen of *Python molurus* 19 feet long that weighed 200 lbs.

The pythons are oviparous and the female *P. reticulatus* is known to brood her eggs by coiling about them. That this is possible without injury to the eggs is remarkable. *Molurus* has been known to lay 107 eggs at a single laying. The family has been divided into two subfamilies that are separated on the characters of the presence or absence of teeth on the premaxillary, and on the presence or absence of a supraorbital bone. The *Pythoninae* have the supraorbital bone and have premaxillary teeth. M. Smith

(1943) has not recognized the two subfamilies. The two subfamilies that have been generally recognized are: *Boinae* Gray and *Pythoninae* Boulenger. These may be differentiated by the following key:

KEY TO THE SUBFAMILIES OF THE BOIDAE

A supraorbital bone present; premaxillary bone toothed; subcaudals usually paired, oviparous . . . . *Pythoninae*
No supraorbital bone; no premaxillary teeth; subcaudal series usually single, ovoviviparous . . . . *Boinae*

Only the Pythoninae occur in Thailand and only a single genus, *Python*, is represented.

Subfamily PYTHONINAE Boulenger

Genus *Python* Daudin

Python Daudin, Histoire naturelle, générale et particulière des reptiles, vol. 5, an X (1803), pp. 226-229 (type of genus, *molurus*).

Diagnosis: Maxillary, palatine and pterygoid bones movable; trans-palatine present; pterygoid extending to quadrate or mandible; supratemporal present, attached scalelike to skull, suspending quadrate. Both jaws with teeth, anterior ones of both jaws elongated and curved; a coronoid present; vestiges of pelvis and legs terminating in a clawlike spur visible on each side of vent. Head with enlarged scales; part of labials bearing pits; scales numerous, in 60-75 scalerows.

The three species of southeastern Asia may be distinguished by the following key:

KEY TO SPECIES OF *Python* IN THAILAND

1. Rostral and four upper labials on each side bearing pits; ventrals from about 300 to 332; subcaudals 75 to 102; very large elongate serpents reaching a length of 8 to 9 meters . . . . *reticulatus*
   Rostral and two upper labials on each side with pits 2
2. Ventrals 245 to 275; subcaudals 58 to 75; large elongate serpent reaching a length of five to six meters . . . . *molurus bivitattus*
   Ventrals 160-175; subcaudals 28-32; a much smaller shorter thicker serpent reaching to a length of about 2.5 meters . . . . *curtus brongersmai*

Python molurus (Linnaeus)

Coluber molurus Linnaeus, Systema naturae, vol. 1, 1766, p. 387; *ibid.*, 10th Ed., 1758, p. 225 (type-locality, India); Andersson, Bih, Sv. Vet. Akad. Stockholm, vol. 24, 4, 6, 1899, p. 35.

Python molurus Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 246; Catalogue of the snakes in the British Museum (Natural History) 2nd Ed., vol. 1, 1893, pp. 87-88; Bourret, Les Serpents de l'Indochine, 1936, p. 18.

Two subspecific forms are recognized, the typical one *molurus molurus* in Ceylon and peninsular India, and *molurus bivitattus* Schlegel found in the Indo-Chinese Subregion, including southern China and Thailand.

Python molurus bivitattus Schlegel

(Fig. 8a)

Python bivitattus Schlegel (*part.*), Essai sur la physionomie des serpens, vol. 3, 1837, p. 403, pl. 15, figs. 1-4 (type-locality, restricted to Java).

Python molurus bivittatus: Mertens, Abh. Senckenb. Nat. Ges., vol. 42, 1930, p. 287, pl. VIII (type-locality fixed as "Java"); Pope, The reptiles of China,

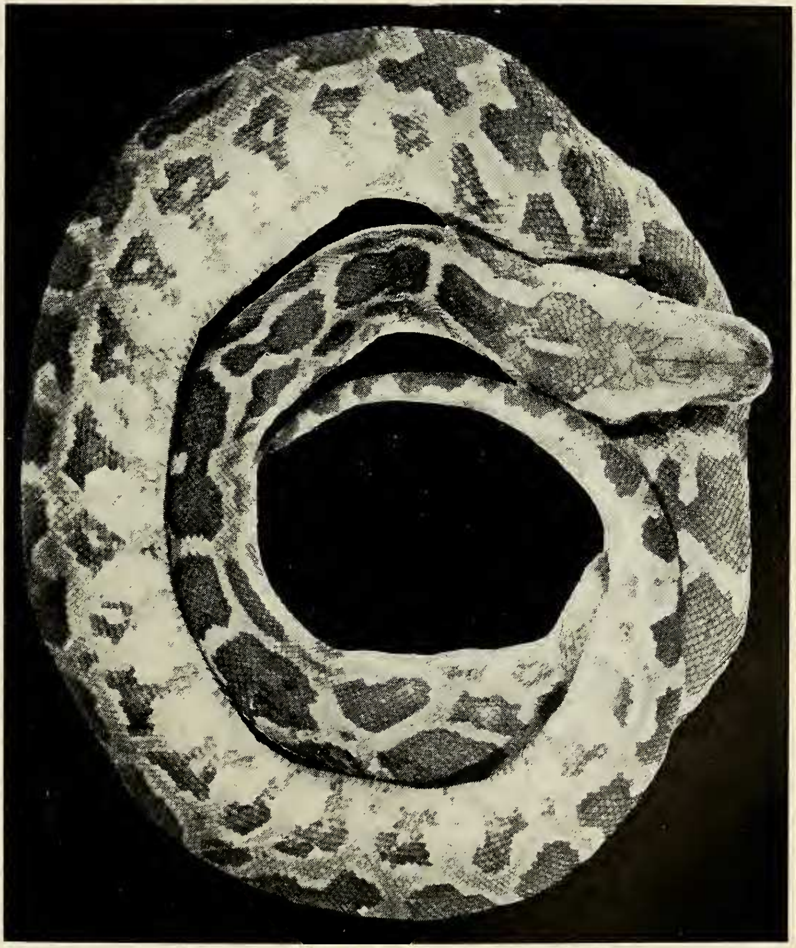

FIG. 8a. *Python m. molurus* Linnaeus. (From Taylor, Univ. Kansas Sci. Bull., vol. 33, pt. 2, 1950, pl. 13, fig. 1.)

1935, pp. 72-75. pl. 5; Bourret, Les serpents de l'Indochine, 1936, pp. 19-20, fig. 9; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 108-109.

Diagnosis: Large serpents; labials separated from eye by suboculars; arrow-shaped mark on head distinct; girth proportionally greater than in *reticulatus.*

Description of subspecies (composite): Nostril at upper posterior part of a large anterior nasal; rostral broader than high with two deep diagonally placed pits; a pair of internasals forming a median suture each longer than wide; a pair of enlarged prefrontals; these followed by a second pair of prefrontals; frontal divided longitudinally, each part about as wide as a supraocular; parietals fragmented; 12 supralabials first two bearing pits, separated from orbit by a row of suboculars; two preoculars; four loreals; two postoculars; about 20 infralabials, only two touching first pair of chinshields; four pairs of chinshields all very small, last pair widely separated from ventrals; pupil vertical; mental small, length of its labial border less than half that of rostral; scalerows around body (*molurus*) 61-75; ventrals, 242-265; subcaudals, 60-72.

Color: Ground color of yellowish brown or grayish brown; a dorsal series of large quadrangular, often somewhat elongated, reddish-brown black-edged spots; on each side a series of smaller spots with light centers; large spear-shaped dark mark from nape to tip of snout with an elongate cream or fawn spot on back of occiput, bordered laterally by a stripe of ground color; a dark stripe from tip of snout through eye widening on temporal region; a small brownish bar below eye; venter and chin yellow-cream; sides brown-spotted.

Measurements: Reaches a length of about 6.5 meters (*fide* M. Smith).

Distribution: Malcolm Smith reports three specimens taken in Thailand from the provinces of Raheng, Lop Buri, and Chon Buri (Siracha). Elsewhere the species occurs in southern China, Hong Kong, Hainan, and the whole Indo-Chinese subregion.

Python reticulatus (Schneider)

(Fig. 9)

Boa reticulata Schneider, Historiae amphibiorum naturalis et literariae, fasciculus secundus, 1801, p. 264 (based on Seba, Thesaurus, vol. 1, pl. 62, fig. 2, and vol. 2, pl. 79, fig. 1, the type-locality not recorded).

Python reticulatus: Gray, Zoological miscellany, 1842, p. 44; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 902; Günther, Reptiles of British India, 1864, p. 330; Boulenger, The fauna of British India . . . Reptilia and

Batrachia, 1890, p. 246; Catalogue of the snakes in the British Museum, vol. 1, 1893, pp. 85-86; Hagenbeck, Spolia Zeylanica, 1905, p. 197; Journ. Bombay Nat. Hist. Soc., vol. 16, Aug. 1905, pp. 505-506; (data from previous article); Sclater, List of the snakes in the Indian Museum, 1891, p. 4; Flower, Proc. Zool. Soc. London, 1899, p. 654; Ridley, Journ. Straits Branch Roy. Asiat. Soc., 1899, p. 196; Mocquard, Les reptiles de l'Indo-Chine, 1907, p. 42; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 107-108, fig. 32 (lower fig.); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, 1914, pp. 9-10 (Bangkok); Gairdner, *ibid.*, vol. 1, no. 2, Aug. 1914, pp. 125-126; M. Smith, *ibid.*, vol. 1, no. 3, Mar. 1915, pp. 155, 187, 213; *ibid.*, vol. 1, no. 4, Dec. 1915, p. 244 (Koh Chang); Werner, Arch. Nat. Berlin, vol. 87, 1921, p. 236; Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 253; *ibid.*, vol. 31, 1926, p. 84; Kopstein, Trop. Natuur., 1927, p. 65; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 11, 1937, p. 61; Bourret, Les serpents de l'Indo-Chine, 1936, p. 16, fig.; M. Smith, The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 109-110.

Boa rhombeata Schneider, Historiae amphibiorum naturalis et literariae . . . vol. 2, 1801, p. 266 (based on Seba, Thesaurus, vol. 2, pl. 80, fig. 1).

Boa phrygia Shaw, General zoology, vol. 3, 1802, p. 348, pl. 97 (based on Seba, Thesaurus, vol. 1, pl. 62, fig. 2).

Coluber javanica Shaw; General zoology, vol. 3, 1802, p. 441 (type-locality, Java).

Diagnosis: Large serpents (28-30 feet); posterior head-scales small; three to five loreals; rostral with two pits, first four supralabials with single pits; 70 to 80 scales around middle of body; no enlarged chinshields; two or three anterior-and five or six posterior infralabials with pits; subcaudals divided.

Description of species (from No. 1692, Kanchanaburi): Rostral about as wide as high, narrowly visible above, with two large diagonal pits reached by sutures from first labials; a pair of large nasals forming a median suture; nostril dorsal, in posterior part of scale, entered by a suture arising at first loreal; a pair of internasals more or less fused to nasals with a median suture; two pairs of prefrontals, second pair broken into several scales; two or three loreals; two preoculars, upper largest; frontal partially broken anteriorly; supraoculars enlarged, irregular, broken on inner side; three postoculars; temporal scales small; supralabials, 13-14, first four with diagonal pits, seventh bordering eye; infralabials, 23-23; second to fourth or fifth with small pits. A mental groove but no well-defined chinshields. Pupil vertical. The parietal region covered with small scales; scales about neck at first ventral, 65; at mid-body, 72; before vent, 44. Ventrals, 322; subcaudals, 92 + 1 or 2; anal single.

Color in life: Above, head uniform brown growing light gray or dirty white on supralabials. A narrow black line begins on snout and runs back to nuchal region where it widens and termi-

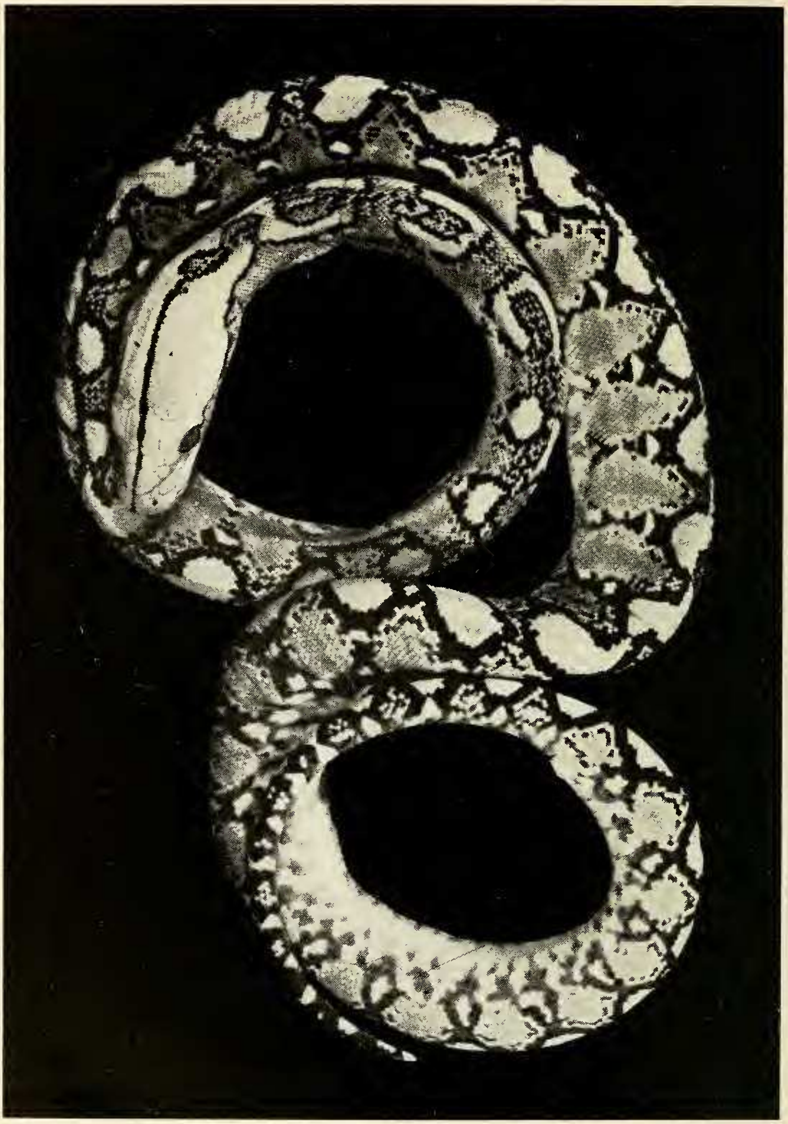

FIG. 9. *Python reticulatus* (Schneider). No. 34530. Pattani, Pattani province. Actual total length, 727 mm.; tail, 112 mm.

nates three centimeters back of head; a narrow black line from eye to back of head; chin and throat white with some indefinite blackish markings on infralabials anteriorly.

On each side of body a zigzag black stripe connecting across back with a similiar series on other side, enclosing along back a series of somewhat oval brown spots edged with light brown; below the zigzag line, a series of ivory to yellowish spots with black spots above and below them; a second series of ocellated spots directly below first series.

More posteriorly the pattern takes on the appearance of a series of black rhombs, touching each other laterally, with a light brown edge about a darker center; ventrals throughout cream to ivory; enlarged scalerows near ventrals with black flecks and spots; subcaudal area black and white spotted.

Measurements in mm.: Total length, approximately 3560; snout to vent, 3084; tail, 476.

Variation: The sixth or seventh supraocular may border eye. There are usually two anterior infralabials bearing pits and five or six posterior infralabials with larger pits. Usually the internasals are free from the nasals.

The scalerows at the middle of the body vary from 70 to 80.

The range in ventrals and subcaudals are respectively: 297 to 332; 75 to 102; subcaudals usually divided.

Distribution: In Thailand the species is found throughout the country except perhaps in the northern parts. Elsewhere it occurs in Burma, much of Indo-China, Malaya, and the Indo-Australian Archipelago as far as the Philippines.

Remarks: In literature this creature is widely known as the python and is probably the largest (longest) serpent known. Specimens measuring 25 feet are not especially rare and specimens reaching a length of 30 feet have been reported, perhaps authentically.

The South American anaconda, also belonging to this family, closely approaches the size of the python, and where specimens of equal length are compared the anaconda may be the heavier and more bulky species.

Most if not all of the Oriental members of the family Boiidae are oviparous, while the new world species are chiefly ovoviviparous.

The python has been known to lay as many as a hundred eggs in a single clutch. The eggs are cared for, the female coiling about the eggs and remaining with them until the young are ready to hatch. The incubation period is said to range between 60 and 80 days.

Mr. John Hagenbeck writes (*loc. cit.*, 1905): "A gigantic python which arrived here last year from British North Borneo via Singapore laid about 100 eggs on the 28th of October, almost filling the box in which she was kept. On the following morning she had collected the eggs by skillful movements of her body into a heap which she completely covered in such a manner that the weight of the body exerted no pressure upon the soft-shelled eggs.

"During the period of incubation I offered ducks, fowls, and geese to the python but she refused all nourishment.

"On the 14th of January she left the mass of eggs quite exposed, and I had given up hope of a successful issue when I discovered the first nestling with half its body emerging from the egg, into which, however, it retired again towards evening.

"The period of incubation lasted exactly two-and-a-half months. The young measures from two, to two-and-a-half feet long.

"Altogether forty-five young have been recovered from the clutch.

"So far as can be ascertained, the parent python measures about 28 ft. in length and weighs 250 lbs."

Python curtus Schlegel

Python curtus Schlegel, Dierentuin Gen. Nat. Amsterdam, Rept. 1872, p. 54; fig. — (type-locality, Sumatra); Hubrecht, Notes Leyden Mus., vol. 1, 1879, p. 244 (between Padang and Indrapura, Sumatra); Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 1, 1893, pp. 89-90; Zeneck, Tübinger Zool. Arbeit., vol. 3, no. 1, 1898, pp. 46-49, 140-143.

Python breitensteini Steindachner, Sitzb. Akad. Wien, vol. 82, 1881, p. 267; Fischer, Arch. für Naturges., 1885, p. 68, pl. 5, fig. 5 (type-locality, Borneo).

Aspidoboa curta: Sauvage, Bull. Soc. Philom, ser. 7, vol. 8, 1884, p. 143.

Three subspecies have been recognized by Olive G. Stull, *loc. cit.*, one of which occurs in Malaya and Thailand; this has been named as follows:

Python curtus brongersmai Stull

(Figs. 10, 11)

Python curtus Blanford, Proc. Zool. Soc. London, 1881, p. 222 (Singapore); Boulenger, Proc. Zool. Soc. London, Nov. 5, 1889, pp. 432-433, pl. 45 (in color; specimen from Malacca, Malaya).

Python curtus brongersmai Stull, Occ. Papers Boston Soc. Nat. Hist., vol. 8, Jan. 28, 1938, pp. 297-298 (type-locality, Singapore.)

Diagnosis: This form may be distinguished from *Python curtus curtus* Schlegel and from the Bornean form *Python curtus breitensteini* Steindachner by the presence of two supraocular plates instead of one; by the entrance into the orbit of two supralabials as compared to none (usually); and a higher average number of ventrals.

Description of species (composite): Rostral wider than high with two relatively deep transverse pits, the scale narrowly visible above; a pair of internasals, slightly longer than wide; two pairs of prefrontals, anterior smaller but equally as wide, forming a suture with its fellow equally as long as posterior pair; frontal segmented longitudinally the two together smaller than a supraocular; three pairs of parietals, posterior shortest; two preoculars upper very large; a series of suboculars; ten loreals on each side; ten supralabials, fifth and sixth bordering eye, first and second with deep pits; infralabials 19, second to fourth and tenth to fourteenth with shallow pits (third to fifth and twelfth to fourteenth on left side).

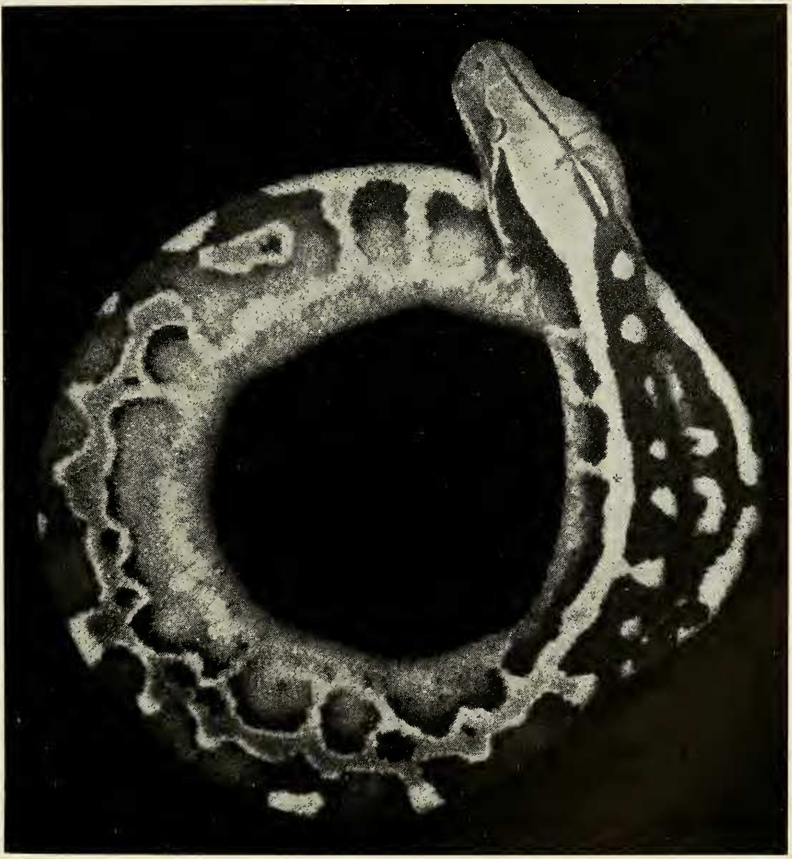

FIG. 10. *Python curtus* Schlegel. B.M. No. 86.5.15.35, Telang, S. E. Borneo. A little less than natural size. (This figured specimen is from Borneo and may or may not be the same subspecies as occurs in Malaya and Thailand)

Scalerow-formula: 51-55-33; ventrals, 174; caudals, 32 (divided).

Color: Above on upper part of dorsum somewhat reddish or orange-red; head somewhat lavender above with light lines on labial edges and another line from behind eye joining labial lines at jaw-angle; a row of cream or fawn-colored spots or spots joined tending to form a median extremely irregular lighter line; a fawn line from head dorsolaterally soon broken into irregular spots that may be more or less connected; a median series of fawn spots on latter fifth of body with darker lateral spots that may be connected; ventral areas cream.

Dentition: Mandibular teeth, 19; premaxillary, 2; maxillary, 19; palatine, 6; pterygoid, 13.

Measurements in mm.: Total length of type, 1180; tail, 112.

Variation: Stull (1938) states that: "Two specimens in the British Museum from Malacca and Kuala Lumpur, Malaya have the following scale counts (made by Dr. H. W. Parker): Scalerows at mid-body, 58, 54; ventrals, 170, 168; caudals, 28, 27; infralabials 19/19 (19-18); two preoculars; two postoculars, two supraoculars, and two supralabials entering the eye on each side."

Distribution: This form has been taken in Thailand only from the extreme southern part in Pattani. Elsewhere it is known from Singapore, the type-locality "Malacca," and Selangor (Kuala Lumpur).

Remarks: The young specimen figured (fig. 10) is B. M. 86.5.15.35, Telang, S. E. Borneo. It probably represents the Bornean *breitensteini*. There is but little color difference in the three forms. The distinctions between the three subspecies recognized by Stull have to do primarily with differences in scale-counts. Thus the ventrals of *brongersmai* average, 170.5, *breitensteini*, 162.5, *curtus*, 159.6, a total variation in averages of 11 ventral scales! There are other differences. The form *brongersmai* has the supraocular broken, and two supralabials bordering the orbit. The single Thai specimen of the peninsular form that I have seen (fig. 11) is a living one taken on Bukit Besar, Pattani and now in the collection of Nai Prayoon Kananuracks. It was not feasible to make scale-counts on the living specimen, and in consequence I am not certain that it agrees wholly with *brongersmai*.

The adults of this species are especially thick-bodied in proportion to their length. The head is proportionally small and short.

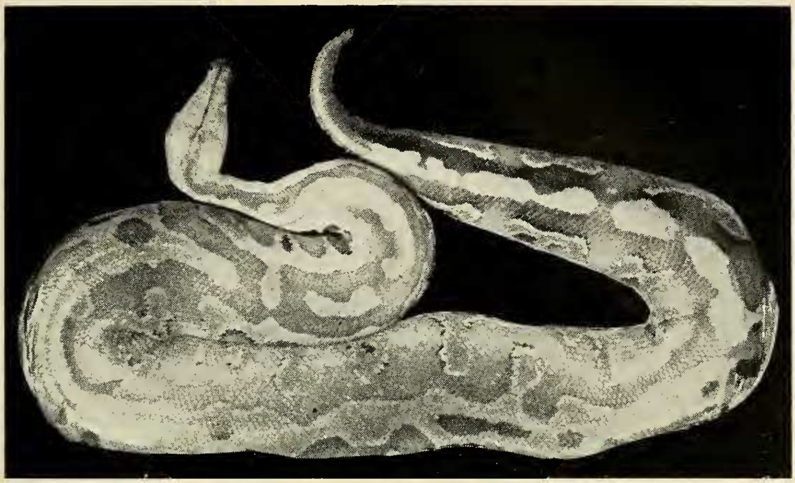

FIG. 11. *Python curtus brongersmai* Stuhl. From a living specimen photographed against the side of a box; Bukit Besar, Na Pradoo, Pattani, Pattani province. Length approximately 2.25 m. (Property of Nai Prayoon Kanaguracks, of Na Pradoo, Thailand. The lateral black marks on the side of the head are indistinguishable from the background making the head appear too narrow; see fig. 10.)

Tweedie (1954) states that "The Short Python is not uncommon in Malaya and is even more attached to water than the Reticulated [python]."

FAMILY DIPSADIDAE Günther

The generic name *Amblycephalus* Kuhl, (1822) applied to an oriental genus of snakes is untenable since it is preoccupied by *Amblycephalus* Zeder (1803), and cannot be used either as a generic name or used in forming a family name Amblycephalidae. The next generic name available is *Pareas* Wagler, and the resulting subfamily name would be Pareatinae.

Dr. James Peters who has recently reviewed a group of Central and South American species of the subfamily Dipsadinae does not commit himself to designating the family to which this subfamily belongs; one may presume that it is considered as a member of the Colubridae or Dipsadidae.

Concerning the Oriental group including the genera *Pareas* (1830) and *Aplopeltura* (1853) Malcolm Smith (1943) states: "Recent workers in this group have separated the American members from the Asiatic. The former can be connected through *Sibon* (= *Leptognathus*) *sibon* with the Colubrinae, while the Asiatic genera cannot. The characters of the shields covering the lower jaws serve to distinguish them at once from all other snakes. Nevertheless, the two groups are closely allied to one another, and probably had a common origin. The mouth is peculiar in that the commisure extends far back beyond the fringe of the buccal membrane, while the short, high head and large eye bear a remarkable resemblance to a foetal snake. Another feature of the Dipsadinae is the enormous development of the nasal gland."

Since the oldest applicable generic designation is *Dipsas* it should be used for the family name, and the Oriental subfamily name would be Pareatinae.

Subfamily PAREATINAE

This subfamily includes two genera, *Pareas* and *Aplopeltura*, which may be distinguished by the following key:

KEY TO ORIENTAL GENERA OF THE PAREATINAE

1. Scales in 15 rows; subcaudals paired . . . . *Pareas*
2. Scales in 13 rows, subcaudals single . . . . *Aplopeltura*

Genus *Pareas* Wagler

Amblycephalus (not of Zeder 1803) Kuhl, Isis, 1822, p. 474 *nomen nudum;* Boie, Isis, 1827, p. 519; (type of genus, *Amblycephalus laevis*).

Pareas Wagler, Natürliches System der Amphibien . . . 1830, p. 181 (type *Pareas carinatus*); Theobald, Descriptive catalogue of the reptiles of British India, 1876, p. 203.

Eberhardtia Angel, Bull. Mus. Hist. Nat. Paris, vol. 26, p. 291 (type of genus *Eberhardtia tonkinensis* = *Pareas hamptoni* (*fide* Malcolm Smith).

Diagnosis: Head very short, thick, distinct from neck; snout blunt; eye large or very large with a vertical pupil; body, especially in arboreal forms, much compressed, tail becoming very slender behind vent; scales in 15 rows throughout body; subcaudals paired; ventrals not angulate. Maxillary short, thin, expanded vertically, with four to nine subequal teeth, the front part lacking teeth; anterior mandibular teeth large, decreasing in size posteriorly; prefrontal bone with a backward prolongation more or less completely roofing orbit; no mental groove, anal single.

The genus occurs in southeastern Asia, the Malay Peninsula, and Archipelago.

There are six species recorded from Thailand, three of which also occur in Malaya. The other three are continental forms that are known either in Burma or Indo-China.

KEY TO SPECIES OF *Pareas* IN THAILAND

1. Vertebral scales not enlarged; body not strongly compressed; labials separated from orbit by subocular; terrestrial.............................. 2
   Vertebral scales of median row (sometimes adjoining rows also) more or less enlarged; body strongly compressed arboreal.......................... 3
2. Scales smooth, usually with, or without an interrupted neck-band; ventrals less numerous.......................................*margaritophorus*
   Scales keeled, usually with an irregular neck-band; ventrals more numerous...*macularius*
3. Labials separated from eye by one or more suboculars................ 4
   Labials not separated from eye, two or three border orbit............. 5
4. A single elongate subocular (sometimes fused to postocular)....*hamptoni*
   Two to eight suboculars.................................*carinatus*
5. Six supralabials, third and fourth (sometimes fifth also) border orbit; third infralabials forming a median suture with each other..............*laevis*
   Seven supralabials, third and fourth border orbit; second or third infralabial joining its fellow to form a median suture........... .*malaccanus*

Pareas margaritophorus (Jan)

(Fig. 12)

Leptognathus margaritophorus Jan, Nouv. Arch. Mus. Hist. Nat. Paris, vol. 2, 1866, p. 8 (type-locality, Siam); Morice, sur la faune de la Cochinchine Française, 1875, p. 60; Bocourt, Nouv. Arch. Mus., Paris, 1886, p. 9.

Pareas margaritophorus: Theobald, Catalogue of the reptiles of British India, 1876, p. 203; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 1-104; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 117.

Amblycephalus margaritophorus: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 445; Flower, Proc. Zool. Soc. London, 1899, p. 694; Mocquard, Rev. Coloniale, 1907, p. 48; Boulenger, Ann. Mag. Nat. Hist., ser. 8, vol. 14, 1914, p. 485 (Key); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1915, p. 215; Werner, Arch. Naturg. Band 87a, Heft 7, 1922, p. 194; Bourret, Invent. Gen. Indochine, 1927, p. 238; Les serpents de l'Indochine, vol. 2, 1936, p. 434.

Pareas moellendorffi Boettger, Ber. Offenb. Ver., 1885, p. 125; *ibid*, 1888, p. 84, pl. 2, fig. 1 (type-locality, Lo-fou-shan Mts., Canton); Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 37.

Amblycephalus moellendorffi: Boulenger, Catalogue of the snakes of the British Museum, vol. 3, 1896, pp. 443-444; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 210-211; Laidlaw, Proc. Zool. Soc. London, 1901, 2, p. 581; Boulenger, Fasciculi Malayenses, Zoology, vol. 1, 1903, p. 170; Smith, Journ. Nat. Hist. Soc. Siam., vol. 1, no. 3, 1915, p. 215 (*moellendorffi*) and Journ. Siam Soc., Nat. Hist. Suppl., vol. 6, Oct. 1923, p. 204; Wall, Rec. Ind. Mus., vol. 24, 1922, p. 23; Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 245; Smith, Bull. Raffles. Mus., no. 3, 1930, p. 88 ("very common at Bangnara, Patani according to Mr. C. J. Agaard"); Pope, Reptiles of China, 1935, p. 373; Bourret, Les serpents de l'Indochine, 1936, pt. 2, p. 433; Tweedie, Bull. Raffles Mus., Singapore, no. 23, 1950, pp. 191-192.

Diagnosis: Prefrontal not excluded from eye; dorsal scales smooth. Loreal separated from the eye by one or two preoculars; eye separated from labials by a subocular; ventrals, 138-159.

Description of species (from No. 34422): Body somewhat compressed; head thickened, distinct from neck, snout blunt, truncate; depression about and behind nostrils; eye large, pupil vertical; area in front of eye swollen; rostral wider than high, excavated below, narrowly visible above; internasals wider than long, narrowly in contact laterally with loreal; prefrontals double size of internasals,

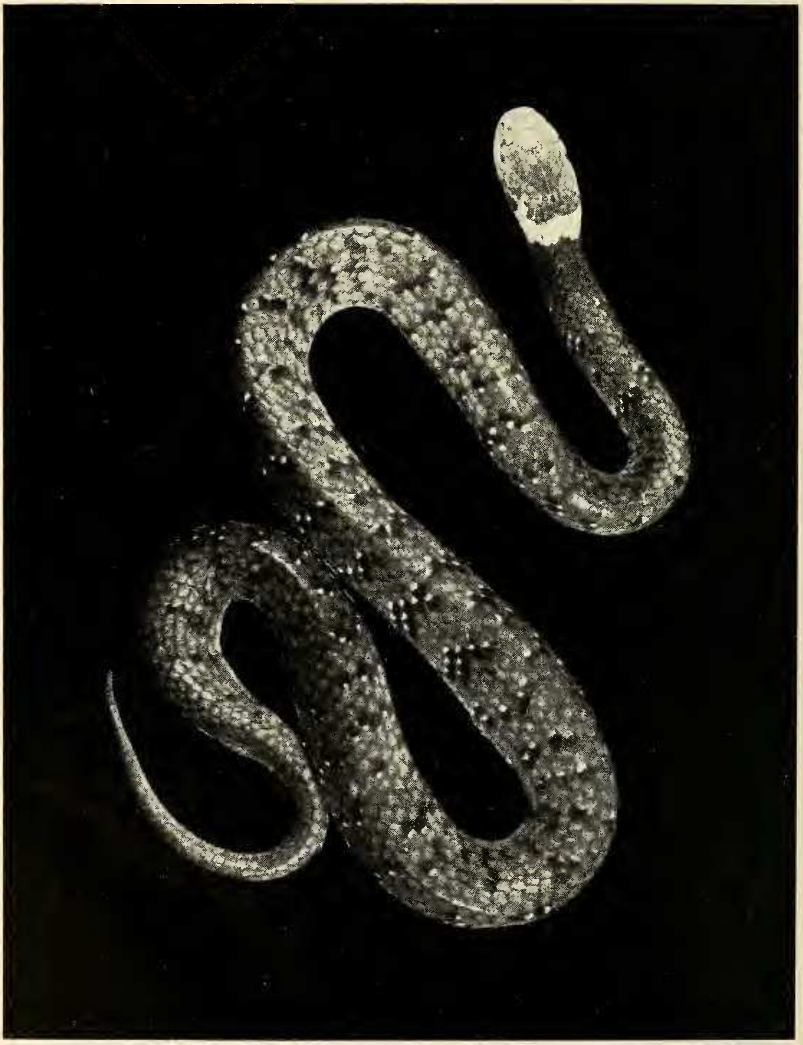

FIG. 12. *Pareas margaritophorus* Jan. EHT-HMS No. 1356♀, Bukit Besar (Mt.), (near waterfall), Na Pradoo, Pattani, province, southern Thailand. Actual total length, 290 mm.; tail, 48 mm.

entering orbit above preocular; frontal subtriangular about as wide as long, slightly shorter than its distance from tip of snout, much shorter than parietals; supraoculars small, subtriangular, side bordering orbit slightly curved; parietals much longer than wide, as long as their distance to tip of snout, much narrowed posteriorly. Temporals, three, followed by three, all narrow elongate; two upper scales in first series touch suborbital, the lower pushed back behind sixth labial; nasal scale large, subquadrangular, the nostril pierced in the posterior part; loreal longer than high; preocular triangular, not touching supraocular; "suborbital" a narrow curving scale extending from preocular, below and behind eye where it is in contact with supraocular; seven supralabials, second to fifth in contact with suborbital; seven infralabials; four bordering first very large chinshields; mental separating first labials and in contact with chinshields; second pair of chinshields make a narrow median suture; third pair triangular, in contact at a narrow point; no groove between chinshields.

Scales entirely smooth, in 15, 15, 15 rows (19 across occiput); ventrals, 146 not angulate; anal single, subcaudals, 51. The tail suddenly becomes very slender a short distance behind vent.

Color: Head variegated lavender-brown, lighter on labials; a pair of black spots behind parietals and smaller less distinct spots at mouth angle preceded by a white area; rostral and dorsal head scutes darker; a cream-white ring about neck (interrupted dorsally on left side) about three scales wide, and followed by a dark band; body generally light brown but darker on anterior fourth of body and neck; a series of very narrow transverse bars, one scale wide, consisting of scales marked in front with cream, and behind with black; laterally they may widen, and rarely divide; venter gray-white, irregularly spotted or flecked with black, the spots not confined to outer part of ventrals, the subcaudal area most strongly marked; chin and neck dirty cream.

Measurements in mm: Total length, 320; tail, 69; head-width, 7.1; head-length, 13.

Variation: The older specimens, according to Theobold (1868) tend to lose the transverse markings and become a uniform ochraceous-brown. It is significant that the scale that I have called the "suborbital" is divided, in the material studied by Blyth and Theobald, into "five, six, or seven small shields which exclude the labials from the orbit." It is possible that his reference is to another species.

In the young specimens the neck-band is mottled with claret-red or orange. The length of one adult is approximately 600 mm. of which 112 mm. is the approximate length of the tail.

Two specimens were acquired in 1961 from two widely separated localities, EHT-HMS, No. 1356 ♀ (figured) from Bukit Besar (near waterfall), Pattani province, and EHT-HMS No. 3923 ♀, 10 km. N. Chiang Dao, Chiang Mai province. These display the following differences:

No. 1356 has three temporals on each side, the two upper touching the large subocular (which is fused to the postocular), the lower one is separated from it and is divided vertically into two scales. The first pair of infralabials form a strong suture behind the mental. The reddish-orange nuchal ring, from two to three scales in width, is complete, followed by a dark band. The ventrals are 149; subcaudals, 41. The venter is gray with numerous scattered gray dots.

No. 3923 has the temporals arranged two over one (elongate), over two. There are two touching the subocular. The first infralabials do not touch behind mental. On one side there are two loreals. In this specimen the collar is incomplete, consisting of an orange spot covering part of eight scales with two median black dots. Ventrals, 153; subcaudals, 39. Otherwise the two specimens agree in color and markings save that No. 3923 has the venter yellow-ivory with many ventrals bearing a small subquadrangular spot on outer ends and only a few scattered punctate dots.

Distribution: The species is known in Thailand from Pattani, Narathiwat, and Chiang Mai.

Elsewhere it is reported from Burma, South China, Indo-China and the northern part of Malaya.

Remarks: The specimen from Bukit Besar was found in a roadside drain, under a small mass of wet leaves. I suspect that subspecies will be designated for some of the variants of this species but much more material is desirable before this is undertaken.

Pareas macularius Blyth

(Fig. 13)

Pareas macularius Blyth, in Theobald, Journ. Linn. Soc., vol. 10, Zoology, no. 41, 1868, pp. 54-55 (type-locality, Martaban, S. Burma); M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 480; The fauna of British India, Ceylon, and Burma, . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, p. 118; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1126-1128, fig. 21.

Amblycephalus macularius: Boulenger, The fauna of British India, 1890, pp. 416-417; Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 444-445; Wall, Rec. Ind. Mus., vol. 25, 1922, p. 24; Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 245; vol. 31, 1926, p. 566.

Pareas andersonii Boulenger, Ann. Mus. Civ. Genova, ser. 2, vol. 6, 1888, p. 601, pl. 5, fig. 3 (type-locality, Bhamo and Kakhyen Hills, Burma; *fide* Smith); separate of same, p. 9.

Pareas tamdaoensis Bourret, Bull. Gen. Inst. Publ. Hanoi, vol. 10, 1935, p. 11 (type-locality, Tam Dao, Tong-King, *fide* Smith); Les serpents de l'Indochine, vol. 2, 1936, p. 431.

Diagnosis: Resembles *Pareas margaritophorus* in color and markings but differs from it however in having a more compressed body. There are keels on five or seven median scalerows, and a somewhat larger series of ventrals and subcaudals.

Description of species (from EHT-HMS No. 31798 ♀, Thailand): Rostral large, slightly wider than high, its upper edge, as seen from above, a straight line; internasals more than twice as wide as long, notching upper edge of nasal, narrower than prefrontals; latter

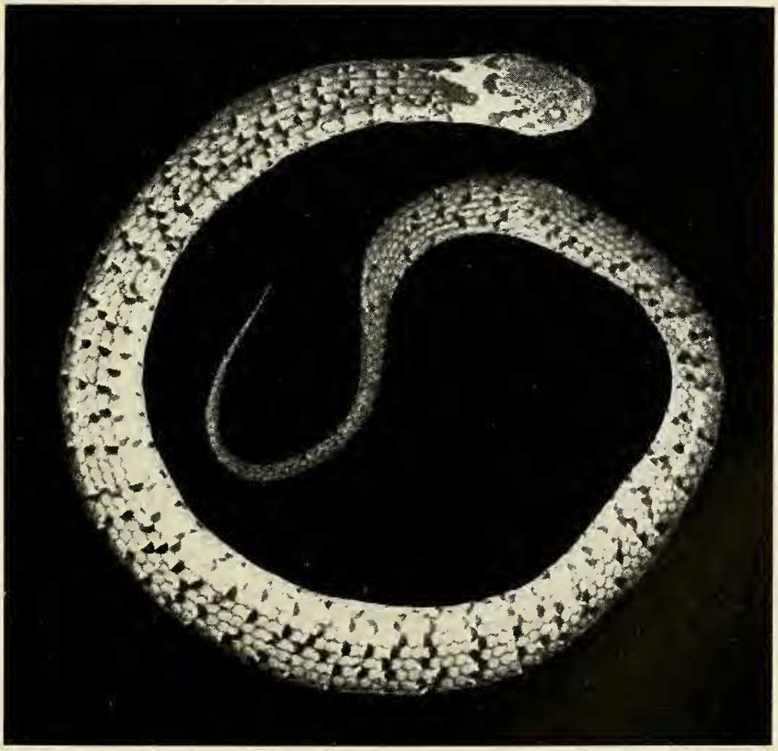

FIG. 13. *Pareas macularius* Theobald. EHT-HMS No. 31798 ♀, Thailand. Actual total length, 210 mm.; tail, 49 mm.

wider than long, touching preocular and loreal, entering orbit; frontal short, six-sided, its length a little greater than width, slightly longer than its distance from tip of snout, shorter than parietals; latter scales longer than their distance from tip of snout; nostril in a single nasal, somewhat triangular; loreal about as wide as high; one preocular, one postocular; a large narrow curving subocular; supraocular not longer than eye; temporals, 2 + 3, but irregular in second (and third) rows; seven supralabials, four or three touching subocular, last much the longest; mental small, touching first pair of chinshields, separating first labials from one another; eight (seven) infralabials, four (five) touch first chinshields which are longer than wide; second and third pairs transversely widened; no groove under chin; first ventral touching third pair much larger than following ventrals; eye higher than its distance from mouth; 20 scales across back of head; 15 rows at neck, middle of body, and before vent; ventrals, 163; subcaudals, 55 paired; anal single; mandibular teeth, 29, the anterior five times as large as the posterior teeth.

Color: Top of head heavily speckled with brown; a pair of black spots behind parietals; diagonal brown line from upper level of eye to mouth angle; on sixth and seventh labials a suggestion of a second line; brown flecks on supralabials; a somewhat zigzag cream nuchal band crosses occiput and nape and merges with light color of chin and throat behind jaw angle; cream band followed by a W-shaped black mark; general body color brown with approximately 60 transverse rows of scales with black dots, each dot bordered anteriorly by cream, the rows irregular and often incomplete. Outer part of ventrals and subcaudal region flecked with brown.

Measurements in mm.: Total length, 210; tail, 49.

Pareas hamptoni Boulenger

Amblycephalus hamptoni Boulenger, Journ. Bombay Nat. Hist. Soc., vol. 11, 1905, p. 236, pl.—(type-locality, Mogok, Burma); Ann. Mag. Nat. Hist., ser. 8, vol. 14, 1914, p. 485; Parker, Ann. Mag. Nat. Hist., ser. 9, vol. 15, 1925, p. 305; Wall, Rec. Ind. Mus., vol. 24, 1922, p. 26; Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 245.

Pareas hamptoni: M. Smith, Ann. Mag. Nat. Hist., ser. 10, vol. 6, 1930, p. 681; Rec. Ind. Mus., vol. 42, 1940, p. 480; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, Dec. 1943, p. 120 (N. E. Siam, near Pak Lai, lat. 18° upper Mekong, etc.)

Eberhardtia tonkinensis Angel, Bull. Mus. Hist. Nat. Paris, vol. 26, 1920, p. 291, figs. 1-3 (type-locality, Laokay, Hong-King), and *ibid.*, ser. 2, vol. 1, 1929, p. 80.

Amblycephalus tonkinensis: Bourret, Les serpents de l'Indochine, vol. 2, 1936, p. 428, fig.; Pope, The reptiles of China, 1935, p. 378, fig.;

Amblycephalus carinatus hainanus M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, p. 204 (type-locality, Hainan).

Amblycephalus carinatus berdmorei: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 88 (*part.*).

Diagnosis: A small species, vertebral scales enlarged; body strongly compressed; frontal shorter than parietal; prefrontal entering eye. Head sharply distinct from neck; one preocular; loreal excluded from eye, or barely touching it.

Description of species: Snout short, blunt; rostral a little higher than wide; internasals about half as long as prefrontals; prefrontals entering orbit; frontal longer than its distance from end of snout, shorter than parietals; loreal as high as long, or a little higher, not or scarcely touching eye; one preocular; one postocular; a long crescentic bandlike subocular connecting pre- and postocular or postocular also united with subocular; temporals, 2 + 2 or 2 + 3; seven or eight supralabials, fourth and fifth below middle of eye; scales in 15 rows, scales smooth or median rows slightly keeled; vertebral series, and sometime adjoining rows feebly enlarged; ventrals, ♂ 191-196; subcaudals, 93-98; of female, ventrals 180-194, subcaudals 73-87.

Color: Similar to *monticola.* Brown above with vertical blackish bars on sides or sometimes extending across back; a black line from above eye to nape, and another from behind eye to angle of mouth; top of head more or less thickly spotted with black; yellowish below, dotted brown.

Remarks: The species is seemingly rare in Thailand. Malcolm Smith's records it from "near Pak Lai lat. 18° upper Mekong," N. E. Thailand, and under the name *Amblycephalus carinatus berdmorei,* he reports the species as being common at "Bangnara" (= Narathiwat, Narathiwat), Thailand. Elsewhere it is known in northern Burma, Tong-King, Annam, and Hainan.

Pareas carinatus Boie

(Fig. 14)

Amblycephalus carinatus Boie, Isis, 1828, p. 1035 (type-locality, Java); Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 445-446; Barbour, Mem. Mus. Comp. Zool. Harvard Col., vol. 44, 1912, p. 138 ("Bangnara, Patani"); Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, pp. 163-164; Wall, Rec. Ind. Mus., vol. 24, 1922, p. 25; J. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 426; Bourret, Les Serpents de l'Indochine, pt. 2, 1936, p. 435, fig.

Pareas berdmorei Theobald, Catalogue of the reptiles in the Asiatic Society's museum, 1868, p. 63 (type-locality, Tenasserium).

Pareas carinatus: Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 37 (Bang Suk, near Pak Jong, Thailand); M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 121; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1128, 1130, fig. 22 (Loei province).

Amblycephalus carinatus berdmorei: Smith, Bull. Raffles Mus., no. 3, 1930, p. 88 (in *part.*).

Diagnosis: Body strongly compressed; vertebral scales somewhat enlarged or not; frontal as long or longer than parietal; prefrontal does not border orbit; head distinct from neck; separated from eye by from two to eight suboculars.

Description of species (from EHT-HMS No. 3626, 10 km. N. Chiang Dao): Body strongly compressed, tail prehensile; head large, distinct from neck; upper lips flaring out. Rostral higher than wide (2½ x 3½ mm.), not, or but scarcely visible from above; internasals triangular, much wider than long, their mutual suture longer than that between prefrontals and forming a suture with the loreal nearly as long as that with rostral; prefrontals a half wider than long, touching loreal and preocular laterally, narrowly separated from eye; frontal with the sides nearly parallel, much wider than supraoculars, longer than its distance to end of snout, slightly shorter than parietal; nasal single, longer than high, nostril pierced in posterior part; loreal higher than long, touching second supralabial and two preoculars of which upper one is highest but widely separated from frontal; one postocular; supraocular touches the postocular and upper anterior temporal; parietals scarcely larger in area than frontal, bordered laterally by four temporals and posteriorly by five postparietals; two or three suboculars separating supralabials from orbit; supralabials, 8-7, first four higher than wide, last two longer than high, the last about three times as long as wide; infralabials, 9-8, first forming a postmental suture, first four bordering first chinshields and first supralabial on left side; mental as wide as rostral; three unequal pairs of chinshields followed by a large azygous scale much larger than first ventral; eye large, its diameter greater than its distance from anterior part of snout. Three anterior temporals, four secondary temporals, somewhat irregular.

Scalerows: 20 (occiput), 15, 15, 15, the median dorsal row (vertebrals) not or scarcely enlarged; ventrals, 174; anal undivided; subcaudals, 72, all save the ultimate divided; several median scalerows keeled.

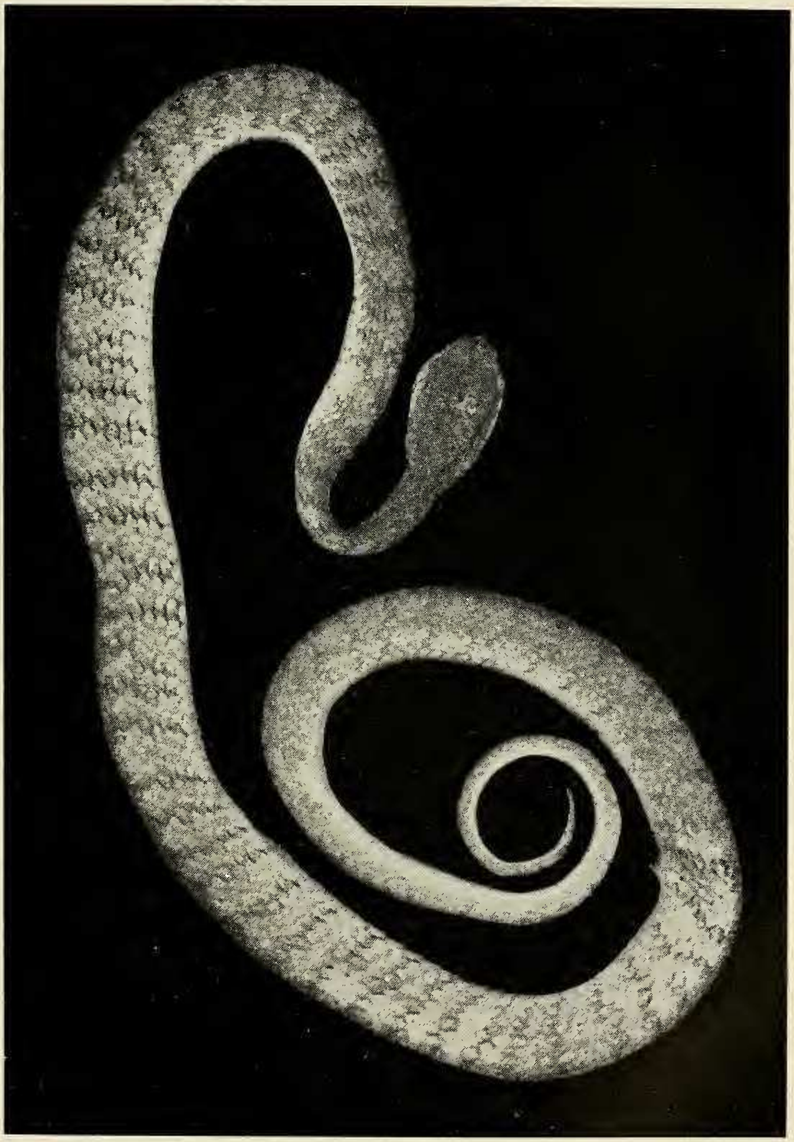

FIG. 14. *Pareas carinatus* (Boie). No. 3626, 10 km. north of Chiang Dow, Chiang Mai province, northern Thailand. Actual total length, 488 mm.; tail, 108 mm.

Color: Head light brown on top and in temporal region, with some black dots. Rostral, supralabials, chin, ventrals, subcaudals and outer scalerow yellowish ivory a little more yellow anteriorly. A more or less connected black line arises back of eye passes back along temporal region to side of neck, narrowly separated from its fellow from opposite side; a hair-fine black line from lower part of eye to lip, crossing subocular, lower anterior temporal and the last two supralabials; on dorsum generally light or olive brown with about 71 transverse darker marks crossing body, these rather indistinct, and usually the width of one scalerow, formed by separate blackish marks on scales and somewhat more scattered pigment; outer edge of ventrals with some fine dots or flecks of dark pigment and a more or less definite row of dark dots; transverse dark marks dim on tail, the subcaudal dots more scattered.

Measurements in mm.: Total length, 488; tail, 108; width of head, 11; length of head, 16; depth of head, greatest, 9.

Variation: A specimen from Loei province has 77-78 bands (different on two sides) while those on a female specimen from the same province are so dim they cannot be counted. The temporals may have a fairly regular arrangement of 3 + 3 + 4 or 3 + 4 + 4. There are five small ocular scales in both of these specimens while there are six in the described form on one side.

The ventrals in five specimens examined (one unnumbered, from an uncertain Thai locality) vary from 158 to 181; the subcaudals from 68 to 72 (Malcolm Smith reports 170-184 for ventrals, subcaudals 60-80).

Data on *Pareas carinatus*

NUMBER	31796	31797	3626
Locality	Loei	Loei	Chiang Mai
Total length	430	522	488
Tail	41+	111	108
Width of head	10	11.2	11
Length of head	16.2	19	16
Scalerows at middle	15	15	15
Ventrals	181	178	174
Subcaudals	26+	71	72
Preoculars	1–1	1–1	2–2
Postoculars	1–1	1–1	1–1
Suboculars	3–3	3–3	3–3
Supralabials	7–7	6–7	8–7
Infralabials	8–9	8–5	9–8

Distribution: The species is widely distributed in Thailand, specimens having been taken in the provinces of Chiang Mai (Chiang Dao), Loei, Narathiwat, and Nakhon Si Thammarat (Khao Luang Mt.).

Outside of Thailand it is known in Burma, the Indo-Chinese region from Lat. 19° N, south throughout Malaya and the Indo-Australian Archipelago. Certain subspecies have been described that may be worthy of retention.

Pareas laevis Boie *in* Boie

Pareas laevis Boie, *in* Boie, Isis, 1827, p. 520 (type-locality, Java); Günther, The reptiles of British India, 1864, p. 328; Tweedie, The Snakes of Malaya, 1954, p. 54, (Northern Malaya).

Amblycephalus laevis: Boulenger, The fauna of British India, Ceylon and Burma; Reptilia and Batrachia, 1890, p. 415; Catalogue of the Snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 441-442; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 209; Laidlaw, Proc. Zool. Soc. London, 1901, 2, p. 581; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia 1917, p. 276; M. Smith, Bull. Raffles Mus., no. 3, Apr. 1930, p. 88 ("Khao Ram in the Nakhon Si Thammarat mountains").

Diagnosis: Small snakes reaching a length of 545 mm., the body strongly compressed; no preocular; loreal and prefrontal entering eye; two or three labials bordering orbit; first chinshield undivided, in contact with mental; third infralabial large touching its fellow; two pairs of large chinshields broader than long; brown with irregular dark crossbands; sides orange, venter brown or yellowish, spotted with brown or with transverse brown spots on sides.

Description of species: Rostral broader than high; prefrontals entering eye; frontal as long as broad or a little broader than long, as long as, or a little longer than its distance from end of snout, two thirds as long as parietals; supraocular very small; loreal elongate bordering orbit; no preocular, one or two postoculars; temporals, 2 + 2; six supralabials third and fourth (third, fourth and fifth) bordering orbit, sixth very long; mental in contact with first undivided chinshield; third infralabial very large forming a suture with its fellow; a small azygos chinshield followed by two pairs of large chinshields, broader than long.

Scales in 15 rows throughout, smooth, vertebral row enlarged; ventrals, 148-176, anal, single, subcaudals, 34-59. Eye large; no longitudinal groove under chin.

Color: Brown above with irregular transverse blackish crossbands; sides dull orange; lower parts brownish or yellowish, spotted with brown or with transverse brown spots on sides.

Measurements in mm.: Total length, 545; tail, 65.

Remarks: The species has been collected only once in Thailand. Dr. Malcolm Smith found it on Khao Ram in Nakhon Si Thammarat. The species, while having a distribution in Sumatra, Java and Borneo, appears to be absent in the lower part of the Malay Peninsula. (Data chiefly from Boulenger, 1912, and Smith, 1930.)

Pareas malaccanus (Peters)

Asthenodipsas malaccana Peters, Monatsb. Akad. Wiss. Berlin, 1864 p. 27, pl. —, fig. 3. (type-locality, "Malacca").

Amblycephalus malaccanus: Boulenger, Catalogue of the snakes in the British Mus., 2nd Ed., vol. 3, 1906, pp. 442-443; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 209-210; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 276-277 (Sumatra, Borneo, Mentawei Islands); M. Smith, Bull, Raffles Mus., no. 3, Apr. 1930, p. 88 (Bhetong, "Patani" = Yala province).

Pareas malaccanus: Tweedie, The Snakes of Malaya 1954, p. 36.

Diagnosis: Small snakes, reaching half a meter in length; no preocular; loreal and prefrontal bordering eye; two postoculars; third and fourth labials bordering orbit; second and third infralabials very large in contact mesially with each other; yellowish or pale brown above with rather irregular dark-brown cross-bars interrupted mesially.

Description of species: Rostral a little broader than deep; frontal as long as broad or a little broader than long, as long as or a little longer than its distance from tip of snout, much shorter than the combined parietals; supraocular small; prefrontal and loreal entering orbit; no preocular; two postoculars; temporals, 2 + 2 the two upper ones sometimes fused; seven upper labials, third and fourth bordering orbit, seventh enlarged; mental in contact with a small azygous scale; second and third infralabials very large, usually in contact mesially on chin; two pairs of large chinshields, broader than long; no mental groove.

Scales in 15 rows, smooth, the three median rows a little enlarged; ventrals, 154-170; anal, single; subcaudals, 26-55.

Color: Yellowish or pale brown above, with rather irregular dark-brown cross-bars which are interrupted on back; vertebral scales yellowish; head sometimes whitish; sides and lower surface of neck black; belly whitish, uniform or speckled with dark brown.

Measurements in mm.: Total length, 440; tail, 50.

Distribution: The species has been taken in Thailand only at Bhetong in Yala province. It also occurs in Malaya, Sumatra and Borneo.

Remarks: Malcolm Smith states that the Bhetong specimen had only the median dorsal scalerow enlarged. Boulenger has suggested that the type-locality should be "Malay Peninsula," rather than "Malacca."

Genus *Aplopeltura* Duméril and Bibron

Aplopeltura Duméril and Bibron, Mem. Acad. Sci. Paris, vol. 23, 1853, p. 463 (type of genus, *Amblycephalus boa* Boie).

Haplopeltura Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 439 (emendation).

Diagnosis: Head strongly distinct from neck; eye large with vertical pupil; nasal undivided; body strongly compressed with long tail. Scales smooth in 13 rows without pits; vertebrals enlarged; costal scales placed somewhat obliquely; subcaudals single; no mental groove.

Maxillary short, thin, expanded vertically, with five subequal teeth preceded by a short space without teeth; 12-13 mandibular teeth, decreasing in size posteriorly; skull with a wide vacuity between parietal, frontal and sphenoid bones.

Only a single species is recognized. The genus is widely distributed from the Philippines throughout the Malay Peninsula and Archipelago.

Aplopeltura boa (Boie)

(Fig. 15)

Amblycephalus boa Boie, Isis, 1828, p. 1034 (type-locality, Java); Günther, Catalogue of colubrine snakes, 1858, p. 184; The reptiles of British India, 1864, p. 325.

Dipsas boa: Schlegel, Essai sur le physionomie des Serpents, vol. 2, 1837, p. 284, pl. 11, figs. 29, 30; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 925, pl. 40, fig. 3.

Aplopeltura boa: Duméril, Bibron and Duméril Erpétologie générale, vol. 7, 1854, p. 444; Smith, Bull. Raffles Mus., no. 3, 1930, p. 88 ("hills to the east of Chumporn = [Chumphon] . . . 1000 ft. elev.").

Haplopeltura boa: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 439-440; Flower, Proc. Zool. Soc. London, 1899, p. 693; Boulenger, Fasciculi Malayenses, Zool., vol. 1, 1903, p. 170; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 208; Taylor, Dept. Agri. Nat. Res. Bureau of Science, Pub. 16, Feb. 11, 1922, pp. 280-283, pl. 34, figs. 7-9 (head); Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 122 (Nakhon Si Thammarat, Chumphon); Tweedie, The snakes of Malaya, 1954, p. 36-37, fig. 6c (head).

Diagnosis: Slender compressed snakes reaching a length of 750 mm.; snout short, head thickened; two (or three) enlarged occipital scales; two or three loreals; a preocular, several suboculars and a postocular; two pairs of infralabials meet behind mental. Scales in 13 rows, vertebrals enlarged; subcaudals single. The color variable from yellowish-gray to brown, blotched, mottled, or clouded with lichen-green or brownish red; below yellowish, mottled with brown.

Description of species (from P.K. No. 101, Na Pradoo, Pattani [near Bukit Besar] Thailand: Rostral narrowly visible above, somewhat more than one-and-one-half times as high as wide, with a high-arched notch at its base, above which the scale is depressed or excavated; internasals extended transversely, suture between scales about one third as long as transverse length of scale (left internasal abnormally broken, the severed part having the appearance of a loreal); prefrontals large, their common suture little less than half width of one scale; frontal hexagonal, sides nearly parallel, anterior and posterior parts having same shape but anterior slightly

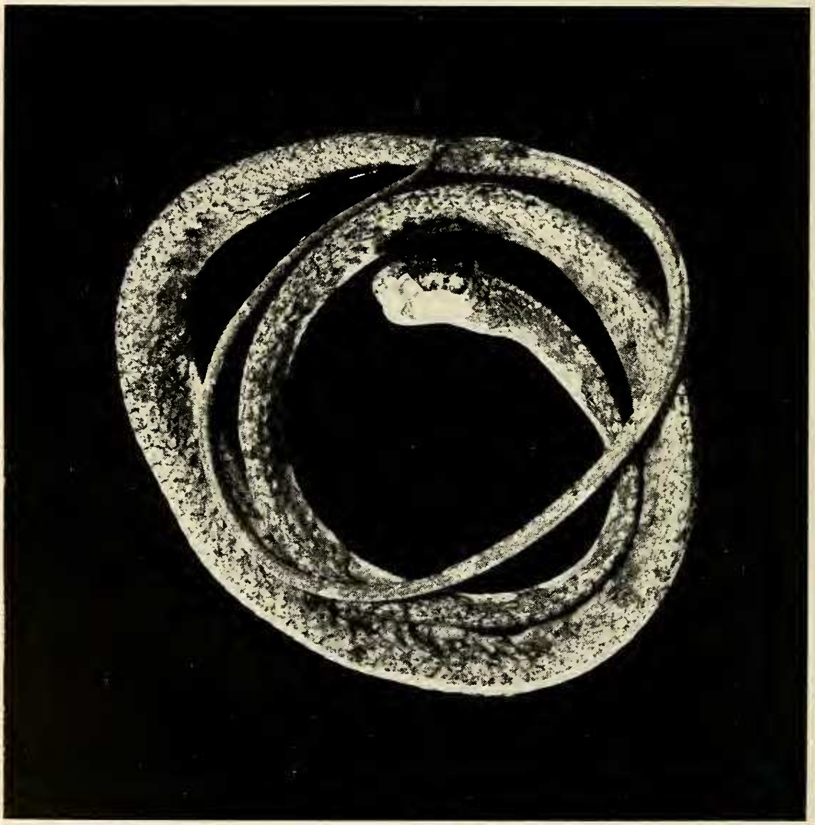

FIG. 15. *Aplopeltura boa* (Boie). P.K. No. 101, Na Pradoo, Pattani province, southern Thailand. Actual total length, 719 mm.; tail, 223 mm.

wider; length of frontal equal to or a little greater than its distance from tip of snout and equally as long as parietals; latter scales relatively small with an elevation near middle; pair of enlarged occipital scales bordering parietals.

Nostril pierced in a single triangular nasal; three loreals of different sizes, upper largest; two distinct preoculars, two postoculars, upper largest; three suboculars; supraocular large bending outward behind eye, with a slight curved emargination on outer edge immediately above eye; three rows of irregular temporals, upper anterior largest, bordering upper postocular; nine (or ten) supralabials, separated from eye by suboculars. Mental small with two pairs of infralabials in contact with each other behind mental; eleven infralabials, posterior one largest; no mental groove present; chinshields followed by two azygous scales, and these followed by three pairs of chinshields which are large but somewhat irregular.

Scale-formula: 26 (bordering occiput), 13, 13, 13; median scale series enlarged; lateral scales narrow, elongate, somewhat oblique; ventrals, 165½; anal single; subcaudals, 108, all single.

Eye large, its diameter equal to its distance from snout-tip; pupil vertical; maxillary teeth five, preceded by a short vacant space, the teeth subequal; 12 (13) mandibular teeth, anterior ones very large, fanglike, diminishing posteriorly in size. Tongue with longitudinal black lines. Head large, much thickened, sharply set off from body.

Color: Above brownish gray with indefinite dark markings and flecks of black; lower on sides mottled with irregular smoky-black blotches; venter generally lichen-gray with some cream color. Head with a conspicuous cream-white spot covering most of the side of face in front of eye; snout tip with numerous blackish flecks; a large blackish spot covers occipital, supraocular and interorbital areas, bordered laterally, behind orbits, with a yellowish stripe that is bordered below by a broken black band; a vertical black mark from eye to lip.

Measurements in mm.: Total length, 719; tail, 223; width of head, 10.5; length of head, 20.

Distribution: The species is widespread, extending from Mindanao, Palawan, and Balabac in the Philippines, through Borneo, Java, Sumatra, Malaya, and Peninsular Thailand.

In Thailand specimens are known from Bukit Besar (mt.), Pattani, Nakhon Si Thammarat, and Chumphon. The described specimen is from Na Pradoo at the base of Bukit Besar.

Variation: The known variation reported in the literature for ventrals is 148 to 191; subcaudals 88 to 127. Scale counts for mainland specimens given by Malcolm Smith (1943) is 166-175 for ventrals, 106-122 for subcaudals. There may be three or two pairs of chinshields and eight to ten supralabials.

The largest specimen, a female, measures 835 mm. in total length; the tail-length being 265 mm.

The wide range with concomitant variation suggests the probability that subspecies occur which merit recognition.

Remarks: The single specimen taken in Thailand and reported by Dr. Malcolm Smith (1943) was colored in life as follows: "pale gray with narrow black cross-bars or almost complete bands; top of head and vertebral scales red, the former speckled with black."

A specimen taken in Agusan province, Mindanao, Philippines was discovered in a small lichen-covered dead tree. When it fell to the ground around an accumulation of dead twigs, it remained motionless in the same position in which it had fallen, and was picked up in this semirigid condition. It was seemingly mimicking the lichen-covered twigs and small branches, since its color resembled markedly that of the twigs.

FAMILY COLUBRIDAE Cope

The family Colubridae contains a large proportion of the living serpents of the world, the bulk of which are without poison and of those with poison-glands and grooved teeth, very few are of danger to man. The family has been broken up into several subfamilies. In this work I have treated the Thai forms in seven subfamily groups. The degree of differentiation in these groups is doubtfully of equal value. They may be differentiated by the following key.

KEY TO THAI SUBFAMILIES OF THE COLUBRIDAE

1. No ventral shields; aquatic snakes (fresh and salt water) with from 100 to 150 small juxtaposed scales around middle of body; .... *Acrochordinae*

   Ventral shields widened; hypapophyses present or absent on posterior dorsal vertebrae 2

2. Dentary bone detached from articular posteriorly; teeth ungrooved, numerous, 30 to 50 in each maxilla and closely set, equal in size, often subspatulate or bayonet-shaped; hypapophyses throughout the vertebral column, terrestrial .... *Sibynophinae*

   Dentary bone not detached from articular posteriorly 3

3. Aquatic snakes (fresh and marine waters), maxillary teeth 10-22, some usually enlarged, grooved, fanglike; nostril crescentic on dorsal surface of snout; hypapophyses developed throughout the vertebral column, all (except *Cantoria*) proably not exceeding a meter in length.... *Homalopsinae*

   Terrestrial serpents. Nostril not crescentic, not situated on dorsal part of skull 4

4. A supraorbital bone; scales completely or almost completely attached to the cutis, and separated from one another by naked skin; head-shields granular or shields normal; labials usually with everted margins; nostril in a concave shield; maxillary teeth 15-35, none grooved or fanglike, *Xenoderminae*

   No supraorbital bone; scales normally not separated by naked skin, not attached alone to the cutis; maxillary teeth with or without grooved fangs 5

5. Maxillary teeth, ten to eighteen, the last two or three teeth grooved and fanglike. Hypapophyses present or absent on posterior dorsal vertebrae; mostly arboreal snakes, none completely aquatic . . . . *Boiginae*

   Maxillary teeth 6-33 without grooves; some may develop enlarged posterior fanglike teeth 6

6. Hypapophyses present throughout the vertebral column (*Natrix, Rhabdophis Pseudoxenodon Macropisthodon Parahelicops, Opisthotropis*) *Natricinae*

   Hypapophyses absent in posterior vertebrae *Gonyosoma, Elaphe, Ptyas, Lycodon, Dinodon, Oligodon, Liopeltis, Dryocalamus, Calamaria, Plagiopholis, Pseudorhabdion, Ahaetulla* . . . . *Colubrinae*

Subfamily XENODERMINAE Cope

Xenoderminae Cope, Ann. Rept. National Museum 1898 (1900) p. 731. M. Smith, Ann. Mag. Nat. Hist., ser. 11, vol. 3, Mar. 1939, pp. 393-395; Werner Mitt. naturh Mus. Hamburg, vol. 26, 1909, p. 206); The fauna of British India, Ceylon and Burma, . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 123.

Malcolm Smith, *loc. cit.* has placed the following genera in this subfamily: *Xenodermus, Nothopsis, Stoliczkaia, Fimbrios* and *Achalinus,* genera, most of which formerly had been considered in the *Acrochordinae.* Of these only a single genus and species is known in our territory. This is *Xenodermus javanicus,* known in Thailand from two specimens taken by me in the province of Yala near the La Doo Tin Mine, Bendang Stah.

Genus *Xenodermus* Reinhardt

Xenodermus Reinhardt, Overs. Viden. Selsk. Forh., 1836, p. 6 (type of genus, *javanicus*).

Gonionotus Gray, in Stoke's, Discovery in Australia, vol. 1, 1846, p. 502, (type, *plumbeus*).

Diagnosis: Body slender, feebly compressed. Scales varied in middorsal region: a median series of somewhat enlarged scales alternating with smaller scales; the two adjoining series equally enlarged, but scales not contiguous in row, separated by two or more very small scales; a dorsolateral series of enlarged, somewhat elongated scales, separated from each other by small scales; scales on flanks small, larger as they approach ventrals, the scales for the most part separated from each other by skin.

Maxillary with 15 equal teeth; pupil vertical; internasals and prefrontals present, but remainder of head covered with very small granular scales bearing keels; tail elongated, with undivided subcaudals. Zygapophyses expanded laterally.

Only a single species is known. It ranges in the Malay Peninsula from southern Tenasserim, Thailand, and Malaya and extending to the islands of Java, Sumatra, and Borneo. It is said to be common at an elevation of from 500-1100 meters altitude in central Java, living in wet earth below the surface of the ground. It feeds chiefly on frogs. The species is ovoviviparous.

Only two specimens are known to have been taken in Thailand.

Xenodermus javanicus Reinhardt

(Fig. 16)

Xenodermus javanicus Reinhardt, Overs. Viden. Selsk. Forh., 1836, p. 6, (type-locality, Java); K. Danske Vidensk Selsk. Skrift, vol. 10, 1943, p. 257, pl. 2, figs. 1-8; Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 175; M. Smith, Ann. Mag. Nat. Hist., ser. 11, vol. 3, 1939, p. 393; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 44-45, figs. 24-25; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 40; Tweedie, The snakes of Malaya, 1954, p. 37, (Penang and Perak, Malaya).

Diagnosis: See diagnosis of genus.

Description of species (from No. 1350, La Doo Tin Mine, Benang Star [Bendang Stah], Yala). Rostral subtriangular, not reaching top level of snout, and not visible above, with a keellike elevation along lateral edges; nasal scale single but with an entrant suture from behind; nostril lunate, a deep depression on posterior part of scale, its back edge flaring up; upper edge with a keellike ridge; two nasals meetings mesially on front of snout; a pair of internasal scales lying back of nasal on upper surface of snout, widening mesially and in contact with each other, their posterior edges keeled; these followed by a pair of larger prefrontal scales, narrowly separated anteriorly by a single scale, the two diverging posteriorly, separated by several small scales; 17 or 18 small supralabials; remainder of head covered with small keeled juxtaposed tubercular scales, about 20 rows between eyes; several scale series lying above supralabials, those following nasals, and scales in frontal area somewhat larger; about 24 minute scales around eye, the three or four above eye largest; mental very small, broadly triangular; first pair of infralabials in contact behind mental; a pair of distinguishable chinshields separated by a row of granules; 21-22 infralabials, a little better differentiated from other scales than supralabials; 13-14 scales between chinshields and first ventral; 88 tubercular scales around head at first ventral; 58 to 60 scales at middle of body; 44 in front of vent.

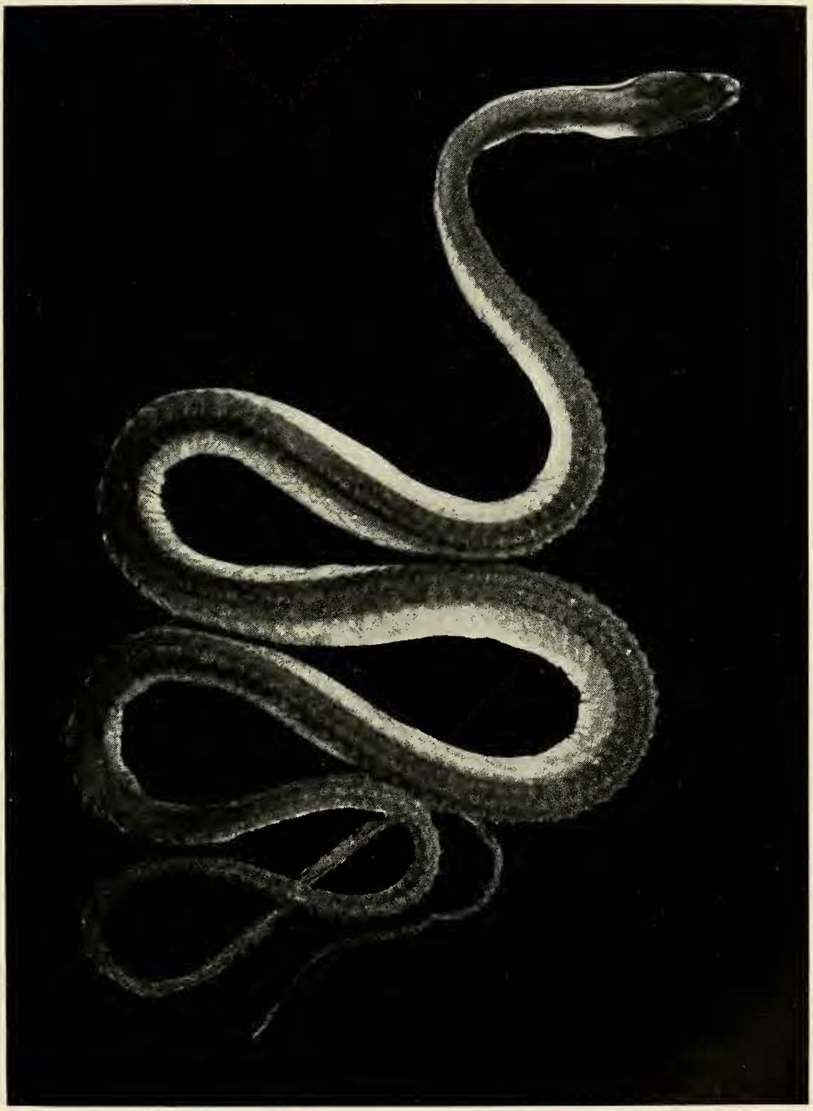

FIG. 16. *Xenodermus javanicus* Reinwardt. No. 1350, La Doo Tin Mine, Yala, southern Thailand. Actual total length, 433 mm.; tail, 282 mm.

Three specialized median scalerows, that in the middle composed of alternating large and small scales, the larger ones more or less alternating with a pair of scales somewhat lateral to it; scales of the two bordering rows are not in contact; a few small scales intercalated among the three rows; separated from these median rows by five or six small granular scalerows is a dorsolateral discontinuous row of scales about half as large as the median rows, the scales longer than wide, separated each from the other by from one to three granular scales; below this row seven or eight irregular rows of fine granules, and below this growing a little larger as they approach ventrals are eleven or twelve rows of scales more or less separated by naked skin; anteriorly the scales of the median rows are small, gradually increasing in size for some distance. Most body scales keeled.

Ventrals, 172 + 1 pair; anal single; subcaudals single, 113; a widely separated pair of scales precedes first subcaudals (the tip of the tail has been injured). (A second specimen, No. 1372 ♂ has the ventrals, 169 + 1 pair; anal single; 124 single subcaudals, posteriorly narrowing, becoming notched then compressed, and keeled with slight terminal mucrones).

Color in life: Head brownish, tip of snout blackish with some whitish marks on nasals and rostral; dorsum brown, light dove-gray on sides; venter gray, each ventral with a transverse gray-brown mark along its anterior edge; subcaudals barred with brown; chin and throat whitish and a whitish mark bordering the anterior ventrals.

Measurements in mm. (Nos. 1350 and 1372). Total length, 433, 386; snout to vent, 282, 243; tail, 151, 143; width of head, 7.5, 6.4; length of head, 11.5, 10.

Variation: The number of scales round the body varies between 40 (*fide* Boulenger 1912) and 60 in the specimen described; M. Smith (1930) reports a Burmese specimen with 170 ventrals, 120 subcaudals and 60 scales around body. The specimen is a female.

The known variation in ventral counts is from 170 to 185; the subcaudals from 124 to 165. The snake reaches a length of 453 mm. The tail length is 228 mm.

Distribution: These two specimens taken at the La Doo mine are the only ones that have been found in Thailand. Elsewhere one specimen has been found in southern Burma, and there are two records for Malaya (Penang and Perak). The species occurs also in Sumatra, Borneo, and Java.

Remarks: The species is reported as being found in Java, burrowing in cultivated land at an elevation of 3000 ft., always near water. The specimen herewith described was found coiled in a soggy rotten log in a stream; it was discovered when the log was kicked to pieces. It was rolled into a ball in a cavity and it remained more or less in a ball after it was picked up and examined.

The other specimen likewise was obtained by kicking to pieces a similar log in the same rivulet, a few hundred feet higher at an elevation of about 2500 ft.

Subfamily SIBYNOPHINAE Dunn

Remarks: The subfamily of the Sibynophinae consists of three genera, *Sibynodontophis,* confined to Centeral America, *Parasibynophis* confined to Madagascar, and *Sibynophis* to the Oriental Region.

Snakes of this group appear to effect autotomy when the tail is grasped by a predator. This would account for the fact that a large proportion of captured specimens have incomplete tails. (See Taylor and Elbel, 1958.)

Genus *Sibynophis* Fitzinger

Sibynophis Fitzinger, Systema reptilium, 1843, p. 26 (type *Herpetodryas gemminatus*).

Polyodontophis Boulenger, The fauna of British India including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 301. (Substitute name for *Enicognathus* preoccupied.)

Diagnosis: Dentary loosely attached, and completely detached posteriorly from end of articular. Teeth very numerous on maxillary, palatine, pterygoid, and dentary, closely set, of approximately the same size; head scarcely distinct from neck; pupil round. Body cylindrical, the ventrals without lateral keels or notches; paired subcaudals; hypapophyses developed throughout vertebrae; anal divided. Oviparous.

Three species occur in Thailand: *Sibynophis melanocephalus* Gray, a southern, peninsular form; *S. collaris* (Gray) seemingly widely distributed; and *S. triangularis* Taylor and Elbel which ranges in southeastern Thailand, Indo-China, and north into Assam.

KEY TO SPECIES OF *Sibynophis* IN THAILAND

1. Tenth supralabial much the largest; black triangular nuchal spot, bordered laterally by a cream or yellow stripe continuous with cream lines on labials .... *triangularis*

   Tenth supralabial not largest, nuchal dark band not triangular 2

2. Ten supralabials, eighth much the largest; two postoculars, only upper touches parietal; temporals, $1 + \frac{1}{1 + 1}$ .... *collaris*

   Nine supralabials; temporals, 2 + 2; two preoculars, both touch parietal; ventrals, 144-169; subcaudals, 120-145; brown or blackish above with two lighter yellowish or bluish-gray longitudinal streaks, each of which may bear a series of black spots .... *melanocephalus*

Sibynophis melanocephalus (Gray)

(Fig. 17)

Lycodon melanocephalus Gray, Illustrations of Indian zoology, vol. 2, 1834, pl. 83, fig. 2, (type-locality, Singapore?).

Herpetodryas prionotus Cantor, Proc. Zool. Soc. London, 1893, p. 52, (type-locality "Malacca").

Ablabes melanocephalus: Günther, Catalogue of the colubrine snakes in the collection of the British Museum, 1858; The reptiles of British India, 1864, p. 229.

Polyodontophis geminatus: (*part.*), Boulenger, Catalogue of the snakes of the British Museum (Natural History), vol. 1, 1893, pp. 185-186; A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore; Reptilia and Batrachia, 1912, pp. 120-121 (*part.*); de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, 1917, pp. 54-55 (*part.*); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 158 ("Bangnara, Patani").

Sibynophis melanocephalus: Tweedie, The snakes of Malaya, 1954, pp. 63-64; Batchelor, Malay Nat., vol. 12, pp. 103-112.

?*Sibynophis geminatus insularis:* Mertens, Senckenbergiana, vol. 9, 1927, pp. 240-241, (type-locality Sabana, North Sumatra).

Sibynophis geminatus: Sworder, Singapore Nat., 1922, p. 60 (Singapore); M. Smith, Bull Raffles Mus., no. 3, Apr. 1930, p. 40 (Narathiwat, Thailand).

Diagnosis: A median dark stripe flanked by two lighter stripes that bear small transverse spots or bars; ventral scales with an influx of lateral color, and a series of black spots on outer part of ventrals. Scales in 17 rows; nine supralabials, fourth and fifth touching eye.

Description of species (from P.K. No. 106 *, Na Pradoo, Pattani, southern Thailand): Rostral more than twice as broad as high, visible above as a narrow line, the outer lower edges of scale somewhat free and tending to overhang mental and two adjoining infralabials; internasals broader than long, more than half size of prefrontals, touching both nasals; prefrontals much wider than long, touching posterior nasal, loreal, and preocular laterally; frontal longer than wide, its length equal to its distance from posterior edge of parietals, greater than its distance from end of snout; parietals elongate, bordered behind by five body-scales, laterally by two temporals, posterior much elongate; nostril between two nasal scales, of which posterior is larger and higher than anterior; loreal small, a little higher than wide; preocular larger than loreal, barely reaching upper surface of head; supraocular large, as long as frontal but less wide; two postoculars, both touching parietal; temporals 2-2, lower anterior largest; both anterior temporals in contact with lower postocular.

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* Collection of Nai Prayoon Kananuracks.

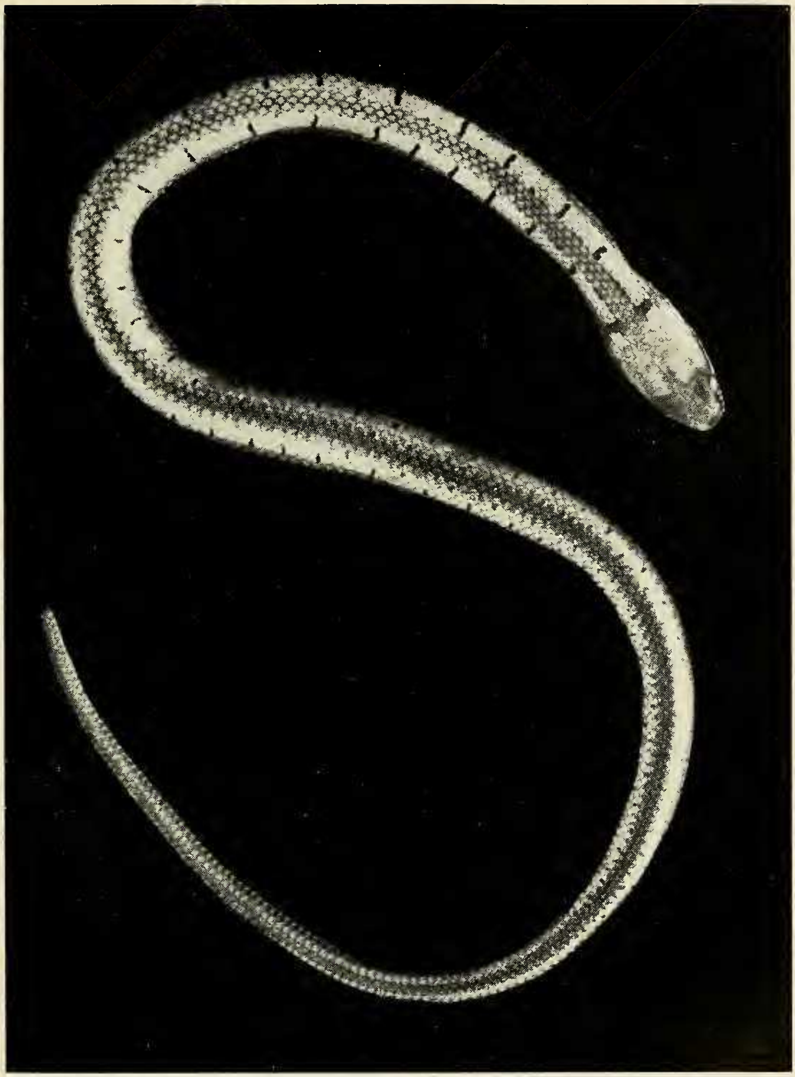

FIG. 17. *Sibynophis melanocephalus* (Gray). P.K. No. 106, Na Pradoo, Pattani; actual length, 288 mm.; tail, 58 + mm. (part missing).

Nine supralabials (eight on left side due to fusion of fifth and sixth), last very large but bordering for only a short distance on mouth; eight infralabials, first pair narrowly in contact behind small triangular mental; four infralabials touching first chinshields which are larger but nearly same length as second pair. Scales smooth without apical pits.

Scale-formula: 24 (occiput), 17, 17, 17; ventrals, 146, anal divided; subcaudals, 32 + (tail defective, part missing).

The maxillary teeth small, subequal, 44-44; ptergopalatine, 45-46; mandibular, 45-40 ±, all with brown tips.

Color: Body with a median dark blackish-brown median stripe covering three median scalerows and edges of adjoining rows, the stripe darkening anteriorly and posteriorly; on either side of this a light yellow-brown stripe, with a series of dark spots or bars often alternating, becoming darker posteriorly, and nearly black anteriorly; brown below this on sides, the color extending onto ventrals, touching a series of deep-black dots which extends from a point an inch behind head to end of tail. Head and occipital region for a distance of about half an inch (8 scales) blackish with faint light flecks; a black line, irregular in width, on sides of neck; posterior labials cream-white with black edges above and some darker flecking below; anterior labials dark, each with a whitish area; infralabials and entire chin faintly clouded with fine pigmentation; throat and venter yellowish-white.

Measurements in mm. (P.K. Nos. 106, 107 respectively): Snout to vent, 288, 128; tail, part missing, 58, 53; width of head, 7.8, 5.5; length of head, 13, 10.

Variation: Only two Thai specimens are available to me, the second being a juvenile from the same locality as the one described. There are 148 ventrals; the anal scale is divided, and there are 117 subcaudals. The posterior part of the body shows the darkening as in the described specimen but the head and neck are lighter. The posterior dorsal head scales are light brown, somewhat darker between the eyes, then somewhat lighter on snout. The scales have some whitish spots and their borders are gray or black. The chin is darker than in the described adult. The rows of black spots are indicated but not clearly marked anteriorly.

Distribution: In Thailand the species is known only in Narathiwat and Pattani. It is reported as being common in the lowlands of Malaya by Tweedie (Snakes of Malaya, 1954, pp. 63-64).

Remarks: Tweedie has stated that Dr. L. D. Brongersma has established the fact that the snake S. *geminatus* (Boie) is a species distinct from this one and it is probably confined to Java. He states that the correct name for this Malayan snake, which is also found on the islands of the Sunda Shelf, is S. *melanocephalus*.

Dr. Mertens has described a subspecies *geminatus insularis* which may actually belong to *melanocephalus,* (Senckenbergia, vol. 9, 1927, p. 240.).

Sibynophis triangularis Taylor and Elbel

(Fig. 18)

Sibynophis collaris triangularis Taylor and Elbel, Univ. of Kansas, Sci. Bull., vol. 38, pt. 2, Mar. 20, 1958, pp. 1130-1134, fig. 23 (type-locality, Nongko, Sriracha, Chon Buri province, Thailand).

Sibynophis collaris (*part.*) Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 277-278.

Diagnosis: Related to *Sibynophis collaris;* a cream-line from rostral extends along the labials and meets its fellow on median nuchal region, widening posteriorly; postoccipital black spot triangular; a median row of quadrangular black spots interspersed with white spots; a lateral light line extends from neck some distance along the fourth lateral scalerow.

Description of species (from type description): Rostral three-fifths times as high as wide, narrowly visible above; internasals a little wider than long, their posterior borders curving, laterally narrowed, touching loreal; frontal a little wider than supraocular (4 mm. x 2.5 mm.), longer than its distance from end of snout; parietals longer than wide, about equal to their distance from rostral; nasal scale divided or at least partially divided with a vertical depression following nostril, posterior portion higher than anterior, touching two supralabials; loreal small, longer than high, touching two supralabials; a large preocular, higher than wide; ten supralabials, fourth, fifth, and sixth enter orbit; sixth and seventh touch lower postocular; a single anterior temporal touches eighth; tenth and last much the largest of series; two postoculars; parietal touching only upper postocular which is nearly square; temporal formula, $1+\frac{1}{1+1}$; nine infralabials, fourth largest, first four touching first chinshields which are larger than second pair; scales smooth.

Scalerows, 17-17-17; ventrals, 160; anal, divided; subcaudals (incomplete), 49.

Color: Generally grayish brown with a fawn line beginning on neck at level of eleventh ventral, following fourth and part of fifth scalerows; somewhat farther back it becomes discontinuous forming tiny elongate or rounded spots on upper half of fourth scalerow,

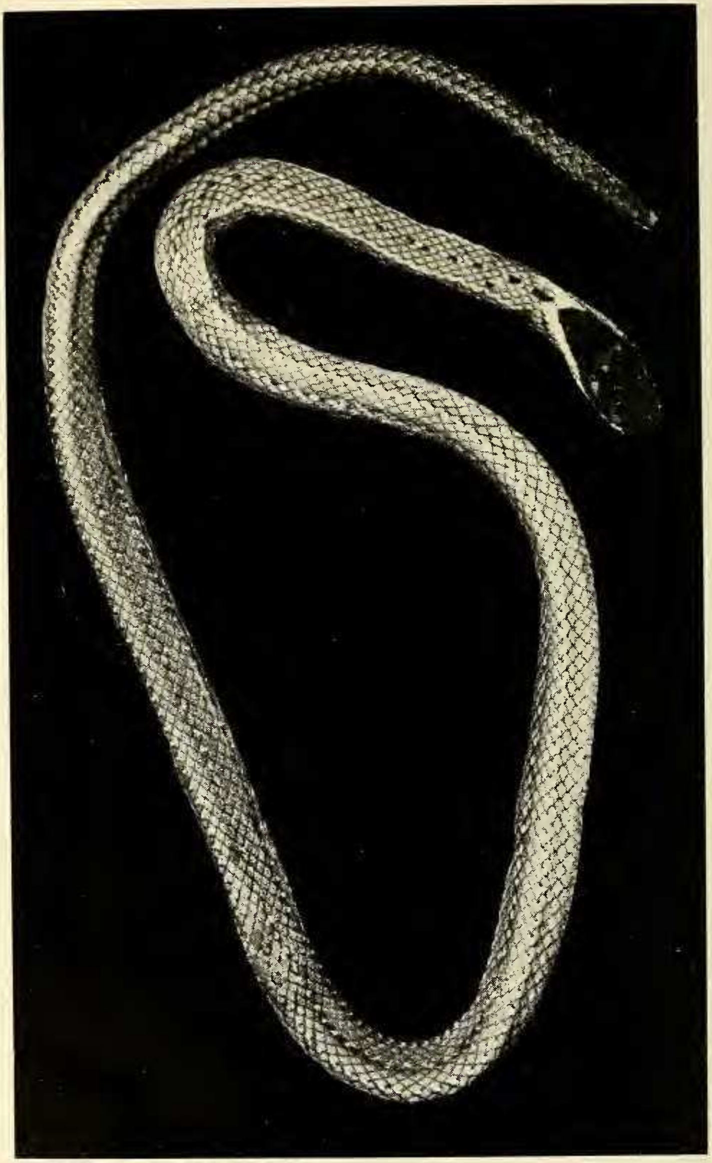

FIG. 18. *Sibynophis triangularis* Taylor and Elbel. Type. KUMNH, No. 33520, Nongko, Sriracha, Chon Buri province, Thailand. Actual total length, 327 mm. (From Taylor and Elbel.)

sometimes including part of adjoining scale in fifth row; pigment surrounding these spots becoming somewhat blackish; on middorsal line a row of small black spots extends a short distance; farther back a discontinuous series of white dots begins and continues posteriorly; these finally become nearly obsolete but they can be traced on to tail; ventral surface whitish with a discrete rounded black spot on outer edge of each ventral and subcaudal; outer turned-up part of ventrals pigmented like lateral body scales.

Head variegated olive with brownish-black spots, one or two on each head scale; an indefinite transverse dark band across back of frontal and supraoculars. A second somewhat indefinite curving band bordering parietals and temporals, joining deep black triangular nuchal spot and this enclosing an olive area; a cream-line from rostral passes back across labials and meets its fellow on medial nuchal region; this bordered above with black on labials; on lower part of some labials black spots present; anterior part of infralabials light brown with darker-edged cream spotting.

Maxillary teeth, 49-47; mandibular teeth, 53-52; palatine-pterygoid series, 53-53.

Measurements in mm.: Snout to vent, 239; tail (mutilated), 88; head-width, 8.15; head-length, 14.

Distribution: Known certainly only from southeastern Thailand in the province of Chon Buri. Malcolm Smith (1943) states: "Specimens [of *collaris*] from Siam and Annam may have a lateral series of yellow spots on scale-row 4 or 5, and the yellow border on the nape may be chevron-shaped, the apex pointing backwards." I suspect that these may be referable to *triangularis.*

Remarks: Originally Taylor and Elbel (1958) regarded this a subspecies of *Sibynophis collaris.* Since the two forms are found together through a wide range it seems wiser to regard each as of specific rank. I have not been able to obtain further specimens of this species.

Sibynophis collaris (Gray)

(Figs. 19, 20)

Psammophis collaris Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 12, 1853, p. 390 (type-locality, Khasi Hills, Assam).

Polyodontophis collaris: Boulenger, Fauna of British India . . . Reptilia and Batrachia, 1890, p. 302; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 184, pl. 12 (*part.*); Annandale, Rec. Ind. Mus., vol. 8, 1912, p. 46; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 316; *ibid.*, vol. 19, 1909, p. 340, 757; *ibid.*, vol. 29, 1923, p. 598; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914-1915, pp. 129, 155, 212; *ibid.*, vol. 1, no. 4, 1915, p. 244 (Koh Chang); Fraser, Journ. Bombay Nat. Hist. Soc., vol. 39, 1937, p. 498.

Ablabes collaris: Stoliczka, Journ. Asiat. Soc. Bengal, vol. 40, 1871, p. 430.

Sibynophis collaris: Smith, Bull. Raffles Mus., no. 3, 1930, p. 40; Rec. Ind. Mus., 42, 1940, p. 482; Pope, Reptiles of China, 1935, p. 86, fig.; Bourret, Les serpents de l'Indo-Chine, 1936, p. 43 (*part.*); Shaw, Shebbeare and Barker, Journ. Darjeeling Nat. Hist. Soc., vol. 13, 1939, p. 115; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 277-278, fig. 94, A, B, C, D (*part.*).

Diagnosis: One anterior temporal touching eighth labial; all ventral scales with a black dot on outer edges; anterior ventrals also with an inner central pair of dots; nape with a transverse black bar bordered behind with white or yellow, little less than width of a single transverse scalerow; a whitish series of spots on anterior labials becoming elongated dashes, and more or less continuous posteriorly.

Description of species (from No. 54, Doi Suthep, Chiang Mai): Rostral twice as wide as high, visible above for half its height; internasals subcircular in form, less than half size of prefrontals which are strongly rounded behind; frontal shield-shaped, longer than its distance from tip of snout, shorter than parietals; supraoculars longer than frontal; nostril between two nasals, posterior part highest; loreal a little wider than high; large preocular; eye large, pupil circular, diameter of eye equal to its distance from front edge of nostril; two postoculars; ten supralabials, fourth to sixth bordering eye; eighth and tenth much enlarged; nine infralabials, mental triangular; first labials in contact; first chinshields larger but about as long as second pair.

Scale-formula: occiput (at fifth ventral), 23; neck, 18; middle of body, 17; before vent, 17. Ventrals, 176; anal divided; subcaudals, 116, divided.

Color in life: Head dark olive with a pair of blackish spots surrounded by tiny yellow dots on rostral, one each on internasals, prefrontals, and supraoculars; minute yellowish punctations on parts of parietals and frontal (distinct under a lens); dim interocular dark band and a similar band behind occiput, bordered behind by a dotted yellow line, each dot smaller than one scale; ocellated white spots on labials; those on posterior labials elongated blue-white dashes bordered below and above by black, more or less connecting with the narrow yellow line. Body brownish with an indistinct median row of tiny black dots and lighter points between; two median rows a little darker than adjoining scalerows;

edges of ventrals and subcaudals colored like first scalerow with a black dot near outer side of each; anterior ventrals with a median pair of black spots also.

Measurements in mm.: Total length, 712; snout to vent, 530; tail 182; width of head, 8.7; length of head, 15.5.

Variation: The coloration in young animals is more distinct, and the pattern more sharply delineated than in old ones. A figure of a young specimen, No. 3180 (Chiang Mai province) is given. It brings out the character of the striping in the posterior part of the body which is largely lost in old adult specimens. The head markings are much the same in these two, as well as in No. 36070 captured at Kaeng Pang Tao in northern Chiang Mai (figured).

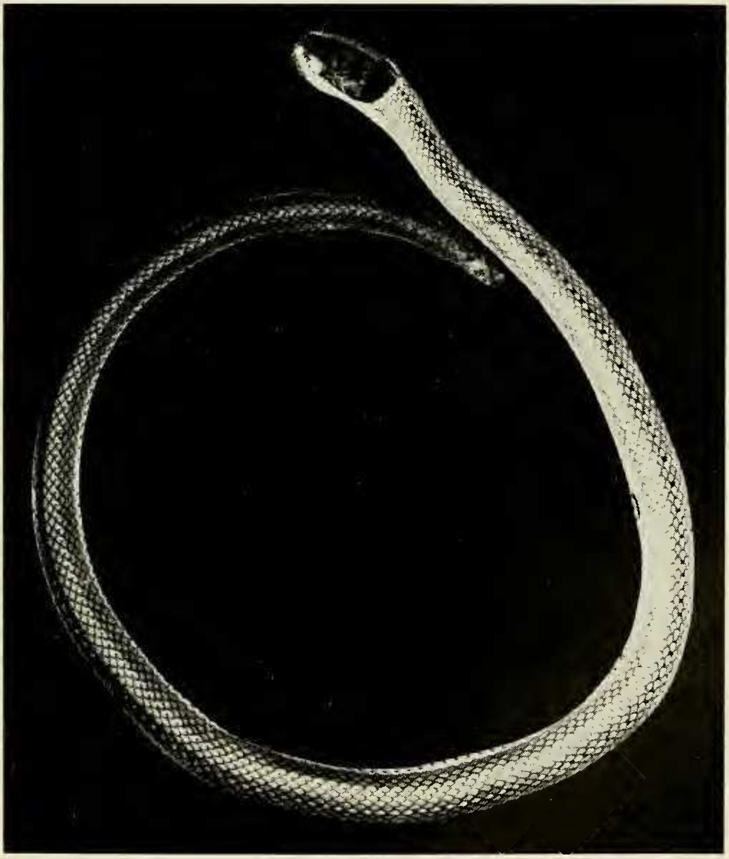

FIG. 19. *Sibynophis collaris* (Gray). No. 3180, Young, Chiang Mai province, Oliver Gordon Young, Coll. Actual length (tail mutilated), snout to vent, 310 mm.

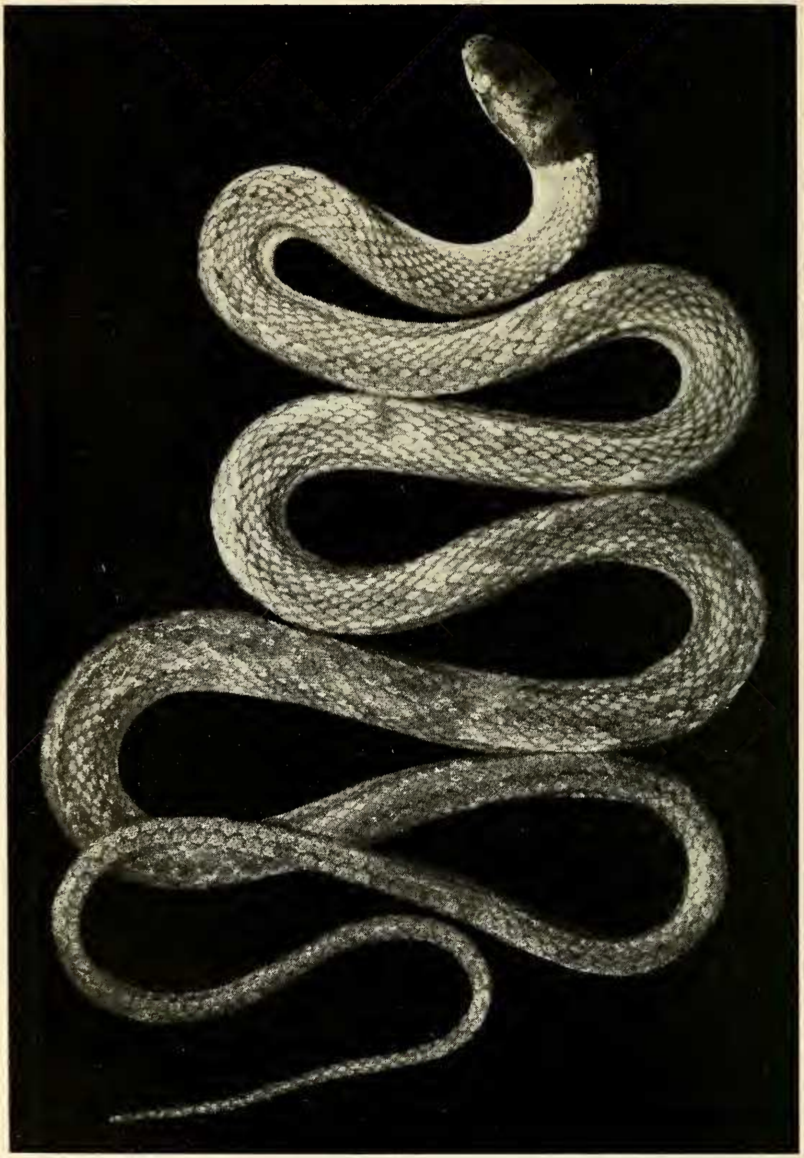

FIG. 20. *Sibynophis collaris* (Gray). No. 36070, Kaeng Pang Tao, northern Chiang Mai. Actual total length, 565 mm.

The known variation in ventrals (*fide* M. Smith) is 155 to 186.

Distribution: The specimens of this species that I have found or been able to study are all from Chiang Mai province. Dr. Malcolm Smith report the species from Koh Chang (island) in the Gulf of Siam.

Elsewhere *collaris* has been reported in northern India, Assam, Nepal, northern Burma and China.

Subfamily ACROCHORDINAE Jan

Acrochordidae Jan, Elenco syst. ofid., 1863, p. 106.

Acrochordinae Boulenger, Catalogue of the snakes in the British Museum, ed. 2, vol. 1, 1893, p. 172 (*part.*).

Hypapophyses present throughout vertebral column; postorbital bone semicircular, partly surrounding upper part of orbit; frontal with two anterior lateral processes; prefrontal small, vertically hanging from the end of frontal expansion, not extending forward upon snout. Skin loose with or without median ventral "seam" or fold.

While there is considerable reason for recognizing these snakes as a distinct family, they are here treated as a subfamily.

For many years two genera, *Chersydrus* and *Acrochordus* were recognized in this subfamily, the most significant difference between them being the presence of the median ventral "seam" or fold present in *Chersydrus*. M. Smith (1943) has united the two stating that, "The presence of a distinct median abdominal fold in *Chersydrus granulatus* does not seem sufficient to separate it generically from Acrochordus."

There are, however, certain other differences besides this (*e.g.* ear-bones). However, until further study of the skeletal characteristics demonstrate still greater differences, I shall accept the proposal of Smith and regard *Acrochordus* as the only genus in the subfamily, with *Chersydrus* a synonym.

Genus *Acrochordus* Hornstedt

Acrochordus Hornstedt, Vet. Acad. Hand., Stockholm, vol. 8, 1787, p. 307 (type of genus, *javanicus*).

Potomophis Schmidt, Abh. Naturv. Hamburg, vol. 2, 1852, p. 75 (type *javanicus;* name preoccupied).

Chersydrus Cuvier, Règne Animal, vol. 2, 1817, p. 75 (type, *fasciatus* Shaw = *granulatus* Schneider).

Diagnosis: Head not distinct from neck; body moderate to very stout, the skin loose, covered with small juxtaposed tubercles; no ventrals present; nostrils surrounded by circular scales; eyes dorsal, small; pupil vertical; chin produced forward fitting into a depression in upper jaw. Maxillary teeth, 12-15, subequal; tail only feebly compressed, somewhat prehensile.

The distribution of this subfamily extends from India through southeastern Asia, the Indo-Australian Archipelago into Northern Australia. Two species are recognized, both occurring in Thailand. They are found in marine waters, river mouths, and even in fresh water. In Thailand the species *javanicus* is known as *ngu nguang chang*, the elephant-trunk snake. It is not uncommon in the canals of Bangkok.

KEY TO THE SPECIES OF ACROCHORDUS IN THAILAND

1. Nostrils terminal directed forward; from 130-150 scales about body, no distinct ventral median fold; no transverse bands; usually some longitudinal striping...*javanicus*

   Nostrils dorsal, directed upward; approximately 100 scales about middle of body. A well-defined median ventral fold; a banded color pattern, *granulatus*

Acrochordus javanicus Hornstedt

Acrochordus javanicus Hornstedt, Abh. Acad., Stockholm, vol. 8, 1787, p. 307 (type-locality, Java); Schlegel, Abbildungen . . . Amphibia, 1839, pl. 17, figs. 12-14; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 905; Günther, The reptiles of British India, 1864, p. 336; Boulenger, Catalogue of the snakes in the British Museum, 2nd ed., vol. 1, 1893, p. 173; Flower, Proc. Zool. Soc. London, 1899, p. 658; Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914-1915, p. 13, 187, 212; de Rooij, The snakes of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 43, fig. 22; Smith, Bull. Raffles Mus., no. 3, 1930, p. 39; Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 132-134, fig. 43, a and b; Tweedie, The snakes of Malaya, 1954, p. 38.

Diagnosis: Large snakes reaching approximately two and one-half meters in length, the girth reaching above 300 mm.; snout blunt, nostrils directed forwards and upwards; eyes dorsal; tubercular scales small, 130-150 around middle of body; no ventral fold on body; no widened ventrals.

Description of species (from No. 1693, Bangkok): Front of snout covered with several curving rows of small irregular scales; nostrils surrounded by two ringlike scales touching mesially, directed straight forward; eyes small, separated from one another by 23 scalerows, from nasal by 14 scalerows; about 30 supralabials, separated from eye by ten scalerows; series adjoining supralabials a little larger than labials; about 31 infralabials; skin of lip itself thick and broken into more or less regular scalelike parts; median part of lower jaws forms a small forward projection that fits into a small arch in upper jaw. Scales on head smallest above eyes and in middle of occiput.

Posteriorly on tail scales rather flattened with a median keel and each side elevated into two blunt keels. These scales may be imbricate; anteriorly keels become higher and somewhat mucronate, the scales separated, tending to stand more erect; posterior edge of scale develops some small spinelike projections; finally scale stands erect the median keel now like a small cone with lateral mucronelike projections forming smaller cones. The central part around cones covered with perhaps hundreds of fine hairlike projections visible under magnification.

On median ventral line a vague elevation; tubercles here smaller than elsewhere around body, those on chin and throat smallest of all. Scales around neck, 126; about middle of body, 126; just anterior to vent, 58. Approximately 566 transverse rows; the extruded hemipenes are approximately 110 mm. in length. Each bifurcates 38 mm. from end, the entire bifurcated parts covered with about 15 somewhat irregular rows of short hard spines. The groove divides and one branch reaches terminus of each bifurcation; proximal to the division there are smooth irregular folds.

Color in life: Above generally olive with a black median stripe with irregular borders; below the olive color a pale yellow stripe with poorly defined edges; below this is a black stripe broken at intervals, continuing back onto tail; below black stripe the sides and venter dull yellowish white, and about midway of body two or three series of dark spots of irregular shape and size begin and continue to vent; subcaudal region dull olive-brown without spots.

Measurements in mm.: Total length, 1725; tail, 301; snout to vent, 1424; width of head, 36; length of head, 55.

Variation: The number of supra- and infralabials vary between 25-32; the number of scales between the eyes varies between 18 and 24; and the number of scales around the body, between 130 and 150. The young are more clearly marked than the adults, and they may be spotted all over.

Distribution: Known from mouths of streams emptying into the Gulf of Siam, and in canals and fresh water klongs that are near stream mouths. It is not a rare snake in klongs and canals in Bangkok.

It is known from the coasts of Cambodia, Cochin China, Malay, the Indo-Australian Archipelago, and Queensland.

Remarks: These snakes are known to reach a length of 2304 mm. (*fide* Günther). They produce 25 to 32 living young at a time. The food consists largely or entirely of fish.

Acrochordus granulatus (Schneider)

(Fig. 21)

Hydrus granulatus Schneider, Historiae amphibiorum naturalis et literariae, vol. 1, 1799, p. 243 (type-locality, India).

Chersydrus granulatus: Günther, The fauna of British India, 1864, p. 336; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, Saigon, 1885, p. 39; Boulenger, The fauna of British India, Reptilia and Batrachia, 1890, p. 355, fig.; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 174; Flower, Proc. Zool. Soc. London, 1899, p. 658; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 116-117, fig. 38; Annandale, Journ. Asiat. Soc. Bengal, vol. 74, 1905, p. 175; Mem. Ind. Mus., vol. 5, 1915, p. 169; Wall, Journ. Bombay Nat. Hist. Soc., vol. 15, 1918, p. 756; The snakes of Ceylon, 1921, p. 79; Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 167; Brongersma, Zool. Med. Rijks. Mus., vol. 16, 1933, p. 14; Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 14; Bourret, Les serpents de l'Indochine, 1936, pp. 35-36, fig. 14.

Acrochordus fasciatus Shaw, General zoology, vol. 3, p. 576, pl. 130 (type-locality not stated).

Chersydrus annulatus Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 61 (type-locality, Singapore and Madras).

Acrochordus granulatus: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 906; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3 Serpentes, 1943, pp. 134-135; Tweedie, The snakes of Malaya, 1954, p. 38; Smith, Bull. Raffles Museum, no. 3, 1930, p. 39.

Diagnosis: Body whitish with a series of 50 or more black bands, widened on back, narrowed on sides and venter; no widened ventrals; a narrow median fold on venter; eye very small with a minute round pupil; nostrils on top of snout, directed upwards; tail somewhat compressed; large series of scales on upper and lower jaw separated from mouth by a series of much smaller scales. Scales tubercular or keeled; about 100 scales around middle of body.

Description of species (from No. 479, Songkhla): Rostral scale very narrow, doubly arched, concealed in a notch of upper jaw, not visible from above; twelve small scales border upper lip; bordering these scales above, a series of 12-13 larger (true) labials; between nostrils and the enlarged series there are two rows of scales, the lower ones enlarged; a single row of scales between nasals; nasals are narrow circular rims about circular craters, followed behind by at least one enlarged scale; eye small with a minute circular pupil, surrounded by eleven small scales varying in size; approximately twelve scales in a line between eyes; a series of about twelve small scales separating a series of much larger infralabial scales from lip; mental in notch between lower jaws, median part of lower jaw fitting into a median notch in upper jaw; scales on snout behind nostrils larger than those on occiput.

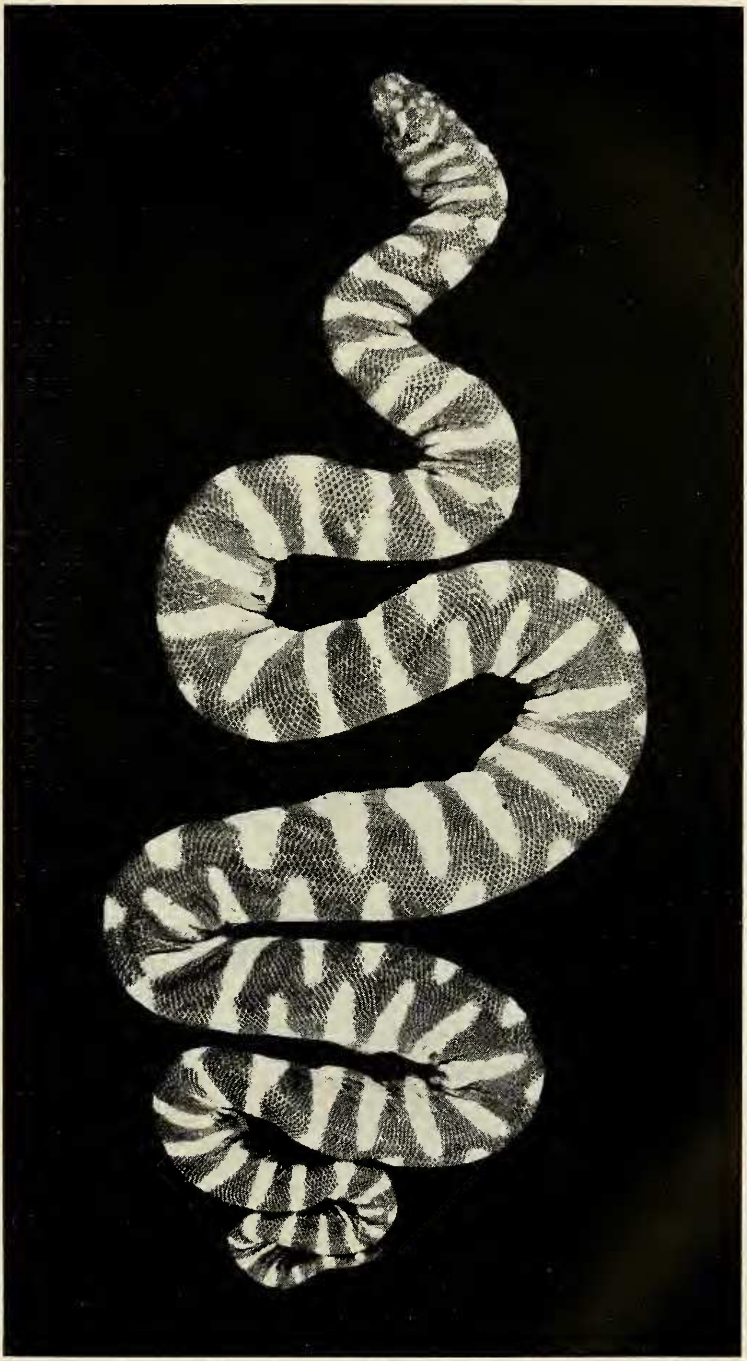

Fig. 21. *Acrochordus granulatus* (Schneider). No. 479, Songkhla, Songkhla province, southern Thailand. Actual total length, 649 mm.; tail, 69 mm.

Scalerows about body: 62, 77, 93, 83, 48, largest scales on dorsum, each with a keel or tubercle; scales along median part of venter pointed; most scales at least anteriorly on body, are elevated, with a short spine arising near to a terminal pit.

Maxillary teeth, 16, for the most part subequal, smallest posteriorly; 15 mandibular teeth decreasing posteriorly.

Color in life: Head blackish with a few dirty white spots; neck and body dirty whitish encircled by approximately 52 black bands, widest on middorsal line, narrowing on the sides and venter, often anastomosing on back, tending to form a median zigzag stripe for a distance. Tail with 13 bands.

Measurements in mm.: Total length, 649; tail, 69; head-width, 14; head-length, 16.5.

Variation: The markings become indistinct in old specimens. The scales in a row between the eyes vary from seven to ten. The scales around the middle of body vary between 89 and 100.

Distribution: In Thailand the species is not uncommon along the coasts. Specimens are more frequently taken near mouths of rivers emptying into the Gulf of Siam. Outside of Thailand the species is known in India, Ceylon, Indo-China, Malaya and the Indo-Australian Archipelago as far as Australia and the Philippines. In the latter country the species occurs very commonly in the large fresh-water lake Laguna de Bay, on the Island of Luzon.

Remarks: This serpent seemingly pays no attention to the presence of man. They are quiet and inoffensive. I have never seen one attempt to bite.

Subfamily COLUBRINAE Cope

KEY TO THAI GENERA OF THE COLUBRINAE

1. Fanglike anterior maxillary teeth.................................... 2
   No fanglike anterior maxillary teeth.................................... 3
2. Maxillary bone strongly arched; rather small snakes (usually under one meter in length)..*Lycodon*
   Maxillary bone not strongly arched; larger, (to one and one-half meters, *Dinodon*
3. Maxillary teeth increasing in size from front to back.................. 4
   Maxillary teeth subequal or anterior teeth slightly larger............. 6
4. Pupil vertically elliptic; six to ten teeth on maxillary; scales in 13 rows around body; slender banded arboreal snakes............*Dryocalamus*
   Pupil round.. 5
5. Maxillary teeth 20 to 28 (Thai species), forming a continuous series, *Ptyas*
   Maxillary teeth 6 to 16, the posterior ones strongly enlarged and compressed; rostral large, often elevated extending well on upper surface of the snout..*Oligodon*

6. No temporal scales 7
   Temporal scales present 9
7. Ten to twelve maxillary teeth; very small snakes (250 mm.); internasals present; scales in 15 rows . . . . *Pseudorhabdion*
   Eight to eleven maxillary teeth, small snakes, less than half a meter in length; no separate internasals (fused with prefrontals); scales in 13 rows, *Calamaria*
9. Scales in 19 or more rows 10
   Scales in 13 or 15 rows 11
10. Scalerows, 23-25; snout projecting; anterior maxillary teeth somewhat larger than others; an elongate loreal three to four times as long as high; large (2 meters) . . . . *Gonyosoma*
    Scalerows, 19-23; maxillary teeth subequal, sometimes anterior, sometimes posterior a little the larger; loreal not twice as long as high; terrestrial snakes, 1½ to 2 meters; longitudinal or banded markings; *Elaphe*
11. Elongate slender arboreal species; scales variable in shape; transverse rows strongly oblique; pupil round; about one meter in length; *Ahaetulla*
    Shorter terrestrial species, the scales nearly uniform; pupil round or vertically elliptic 12
12. Pupil vertically elliptic; 16-20 equal maxillary teeth; anterior temporal not longer than posterior; loreal not especially small; (less than half a meter in length) . . . . *Plagiopholis*
    Pupil round; 26-28 maxillary teeth, subequal; anterior temporal twice length of posterior; loreal very small; (to half a meter in length); *Liopeltis*

Genus *Gonyosoma* Wagler

Gonyosoma Wagler, Natürliches System der Amphibien, 1828, pl. 9 (type of genus, *viridis* = *oxycephalum*); Taylor, Snakes of the Philippine Islands, 1922, p. 152.

Diagnosis: A genus of large arboreal snakes reaching a length of 2.3 meters; scales faintly keeled or smooth; elongate apical pits present; loreal elongate; hemipenes with spines elongated.

There is no unanimity of opinion as to the number of species in this genus, but two forms, possibly three are known to occur in Thailand. It is probable that *floweri* and *jansenii* should be placed in the genus *Elaphe*.

KEY TO FORMS OF *Gonyosoma* IN THAILAND

1. Uniform green on body, (the interstitial skin with black and white reticulations); ventrals outside lateral keel whitish; tail often colored differently from body, usually reddish or each caudal scale edged with darker; two supralabials border orbit . . . . *oxycephalum*
   Not uniform green 2
2. Light or dark buff marked all over by scattered irregular blotches of dark brown or black; venter uniform whitish or with spots similar to those on dorsum; two supralabials enter eye, third touches it at a point . . . . . *floweri*
   Bright yellow-brown above, the scales black edged. A pair of black lateral stripes begin at about the 36th ventral level, and continue back, widening greatly. Venter yellowish anteriorly, blackish with yellow keels posteriorly; three labials border orbit . . . . *jansenii elegans*

Floweri is known from Singapore north to Trang province in Thailand. *Jansenii elegans* is known from the type taken reputedly in Thailand by (Schilling). *Jansenii* is a Celebean species, and the presence of this form in Thailand should be reconfirmed.

Gonyosoma floweri (Werner)

Coluber floweri Werner, Stizb. Akad. Wiss. Wien, Abt. 1, vol. 134, p. 55 (type-locality, Singapore).

Elaphe oxycephala (*part.*) M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes 1943, pp. 144-146).

Diagnosis: See key.

Description of species (from type-description): Internasals three fifths as long as prefrontals; frontal one and one-third times as long as broad, as long as its distance from rostral, shorter than parietals; loreal three times as long as broad (left one split vertically); a large preocular in contact with frontal; two postoculars, upper distinctly larger than lower. Temporals, (left), 2 + 2 + 3; (right), 3 + 2 + 3 + 2 + 1; ten supralabials, sixth to eighth border orbit; five to seven infralabials in contact with anterior chinshields. Eye not half as long as its distance from nostril.

Color: Above bright yellow-brown, scales black-edged with small irregular black flecks. A dark postocular band above upper edge of supralabials; venter yellowish; tail spotted.

Measurements: About one and one-half to two meters.

Remarks: This snake is related to *Gonyosoma j. jansenii* Bleeker of Celebes.

The three supralabials, sixth to eighth (fifth to seventh) borders orbit. The postorbital band is present and this and the distinctive coloration of the posterior part of the body seems to separate *floweri* from the species in Celebes.

Gonyosoma jansenii Bleeker

Gonyosoma jansenii Bleeker, Nat. Tijdschr Nederland Ind., vol. 16, 1858; (type-locality, Manado, Celebes); Boulenger, Proc. Zool. Soc. London, 1897, p. 220.

Allophis nigricaudus Peters, Monatsb. Akad. Wiss. Berlin, 1872, p. 686.

Elaphis nigricaudus: Peters and Doria, Ann. Mus. Civ. Genova, vol. 13, 1878, p. 387.

Diagnosis: See key.

This form presumably has two subspecies the typical form in Celebes and a second one described from Siam by Werner as *Coluber jansenii elegans.* He however regarded it as a "Färbenvarietät." There may be some doubt that the form actually originated in Thailand. (The collector's name is given as "Shilling".)

Gonyosoma jansenii elegans Werner

Coluber janseni elegans Werner, Sitzungsb. Akad. Wiss. Wien, Abt. 1, vol. 134, 1925, pp. 55-56 (type-locality, "Siam").

Elaphe oxycephala M. Smith, The fauna of British India, Ceylon and Burma . . . vol. 3, Serpentes, 1943, pp. 144-146 (*part.*).

Description (from type-description of ♂): Ventrals, 257, subcaudals, 132 + 1; scalerows, 25. Loreal twice as long as high; nine supralabials, fifth to seventh border eye, ninth very long. Temporals, 2 + 3 + 4.

Color: Bright yellow-brown; lateral stripes begin on sides above the 3rd ventral; at first two small short lines that fuse and widen, covering about eight scalerows posteriorly. The edges of stripe irregular at first then they become parallel, the five scalerows between being lighter; posterior part of body and tail entirely black. Anterior part of venter uniform yellow, posteriorly bordered with black.

Measurements: Not recorded ("groses" ♂).

Gonyosoma oxycephalum (Boie *in* Boie)

Coluber oxycephalus Boie *in* Boie, Isis, 1827, p. 537 (type-locality, Java); Boulenger, The fauna of British India, including Ceylon and Burma; . . . Reptilia and Batrachia, 1890, p. 335; Catalogue of the snakes in the British Museum, 2nd ed., vol. 2, 1894, p. 56; Annandale, Journ. Asiat. Soc. Bengal, vol. 1, 1905, p. 175; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1901; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 143-144; Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 622; M. Smith, Proc. Zool. Soc. London, 1921, p. 426; Rendahl, Ark.-Zool. Sven. Vet., vol. 29, A. 10, 1937, p. 22.

Herpetodryas oxycephalus: Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 189, pl. VII, figs. 8, 9; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 927.

Gonyosoma oxycephalum: Günther, The reptiles of British India, 1864, p. 294. Stoliczka, Journ. Asiat. Soc. Bengal, vol. 39, 1870, p. 193. Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 51, 65; Taylor, Snakes of the Philippine Islands, Bureau of Sci. Manila Publ. 16, 1922, pp. 152-155; Schmidt, Amer. Mus. Novitates, no. 157, 1925, pp. 1-5; Dowling, Copeia, 1958, no. 1, pp. 29-40, fig. 1A.

Elaphe oxycephala: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, Mar. 1915, p. 213; *ibid.*, vol. 2, No. 2, Dec. 1916, p. 161; Proc. Zool. Soc. London, 1921, p. 426; Journ. Federated Malay States, vol. 10, 1922, p. 266. Bull. Raffles Mus., no. 3, 1930, p. 50; Bourret, Les serpents de l'Indochine, 1936, vol. 2, pp. 204-206, fig. 81; M. Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 144-146, fig. 45.

Gonyosoma viride Wagler, Descriptiones et icones amphibiorum pt. 1, 1828, pl. 9 (type-locality "Brazil").

Alopecophis chalybeus Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 4, p. 247 (type-locality "Mauritius").

Aepidea robusta Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 488 (type-locality, Gasper Straits, Malay Archipelago); Stejneger, Proc. United States Nat. Mus., vol. 69, 1926, p. 3 (= *oxycephalum*).

Diagnosis: Large snake exceeding two meters in length; snout about three times as long as eye; supralabials, 10 to 11, last much enlarged; 12 to 14 infralabials; ventrals somewhat keeled; scale-formula: 23, 23, 15; entire head and body green in life; tail brown-buff or reddish; light yellow-green below.

Description of species (from No. 33638, Doi Suthep, Chiang Mai, Gordon Young, Coll.): Snout three times length of eye, somewhat wedge-shaped extending noticeable beyond mouth; rostral higher than wide; visible above as a small triangle; internasal longer than wide; prefrontals longer than wide, touching loreal and posterior nasal laterally; frontal small, rounded posteriorly front edge nearly straight anteriorly, less than a fifth longer than wide, shorter than its distance to end of snout; shorter than parietals; nasal completely or partially divided, anterior part as large as posterior; loreal about three times as long as high; preocular large, about as long as high, bordering frontal; supraoculars three fifths as wide as frontal; two postoculars; temporals somewhat irregular; nine supralabials, three touching loreal, sixth and seventh entering orbit; last double the length of two preceding it; infralabials, 12, six touching large chinshields which are more than four times size of second pair.

Scale-formula: 30, at first ventral, 23 (24), 24 (25), 16, (15). The scales with indistinct paired apical pits; several dorsal scale-rows very near middle of body showing almost obsolete keels. Each scale shows longitudinal striation under magnification.

Maxillary teeth 21-21; anterior a little longer and more curved than posterior.

Color in life: Body green above, darkest on head; tail light chestnut or buff-red, the two colors meeting abruptly at level of vent. On anterior half of body scales may be edged with black; an indistinct blackish stripe along side of head immediately above labials; light greenish-yellow below on venter.

The specimen here described is darkened by preservation and is nearly uniform plumbeous; venter dark, the posterior edge of each ventral scale being whitish; a whitish line following blunt keel along each side of ventrals. A light area on rostral and a light area on each side under head. The chinshields and infralabials plumbeous; a slightly wider light line follows keel on subcaudals; tail brownish, the scales with a somewhat lighter center.

Measurements in mm.: Snout-vent, 447; tail, 142; total length, 589; length of head, 20; width of head, 12.

Variation: A specimen captured at Khao Chong (No. 35708) differs somewhat from that described. The rostral is visible above as a narrow line; the internasal is small, less than half the area of a prefrontal. The frontal is pentagonal and rounded somewhat posteriorly. Two (or three) preoculars, the one (or two) lower scales separate the fifth labial from eye. The temporal formula is 1 + 2 + 3. Ten supralabials are present, the sixth and seventh bordering eye, and thirteen infralabials. The second pair of chinshields are separated by two or three scales.

The coloration in life of this specimen was as follows:

The body was green with a buff or reddish tail, and a greenish yellow venter. Many of the scales on the anterior part of the body were decorated with a tiny line of blackish dashes, while farther back many of the diagonal transverse scalerows had each scale bearing tiny white dashes. On the sides the black and white marks were concealed normally by imbricating scales. The top of the head and chin were green while the throat was yellowish white. The tail was reddish but each scale had a darker border. A median dark zig-zag line flanked by unpigmented reddish stripes, was on under side of the tail.

This specimen has the following scale-counts: scale-formula 32 (occiput), 27, 25, 25, 17. The ventrals are 249, keeled and often notched; subcaudals, 138; anal, divided.

Distribution in Thailand: The species has been taken in the provinces of Chiang Mai, Narathiwat, and Trang.

Outside of Thailand the species is known in Cambodia, Malaya, Singapore, Burma, Borneo, Java, and the Philippines.

Remarks: The species is very large reaching a known length of 1880 for a male; 2100 mm. for a female.

Genus Elaphe Fitzinger *in* Wagler

Elaphe Fitzinger, *in* Wagler, Descriptiones et icones amphibiorum, pt. 3, 1833, text to pl. p. 27 (type of genus *parreysi* = *quatuorlineatus*).

Diagnosis: Maxillary teeth, 14-24 somewhat enlarged anteriorly and posteriorly; head only slightly distinct from neck; pupil round; body subcylindrical; scales with paired apical pits in 19 to 27 rows, smooth or keeled; ventrals rounded or angulate laterally; subcaudals divided; five or six infralabials touch first chinshields.

A very large genus with species in Asia, Europe, and North America. In Thailand four species are known, all of them having wide ranges.

They may be differentiated by the following key:

KEY TO THAI SPECIES OF *Elaphe*

1. Scales in 19 (more rarely 21) rows.. 3
   Scales in more than 21 rows.. 2
2. Scales in 23 rows; a black stripe along side of head; anterior part of body nearly unicolor; posteriorly with a median light stripe and two broad black stripes.. *taeniura ridleyi*
   Scales in 23 to 25 rows; anterior part of body with a median series of butterfly-shaped spots and a lateral series of smaller diamond-shaped spots, *taeniura taeniura*
3. A single narrow black transverse occipital bar or band with black lines running forward from bar to eye; head coppery brown.......... *radiata*
   Numerous wide dark transverse bars on body or none................. 4
4. Scales smooth; body reddish brown with numerous wide dark-edged dark-brown crossbands; a pair of black lines running forward from first band to eyes; a median black stripe on head........... *porphyracea porphyracea*
   Scales keeled; a median light yellowish-brown stripe flanked by two narrow black stripes anteriorly; a series of black ventrolateral spots or ocelli on anterior third of body.. *flavolineata*

Elaphe taeniura (Cope)

Elaphis taeniurus Cope, Proc. Acad. Nat. Sci., Philadelphia, 1861, vol. 12, p. 565 (type-locality, Ningpo and Siam); M. Smith, The fauna of British India . . . vol. 3, Serpentes, 1943, pp. 150-152.

Thailand has two forms, presumed subspecies of *taeniura.* One, *t. ridleyi,* is a common inhabitant of certain caves in peninsular Thailand; the other a northern form, reported by Malcolm Smith, from Chiang Mai and Hin Lap in the Dong Rek mountains, presumably belongs to the typical subspecies.

KEY TO THAI SUBSPECIES OF *Elaphe taeniura*

1. Top of head dark gray; side of head with a black stripe from angle of jaw, fading near nasal. Anterior part of body pale flesh gradually developing pigment forming two broad black bands with a median cream band between and bordered by yellow stripes on outer scalerow and outer part of ventrals; this yellow line bordered by faint dark lines to tip of tail, *t. ridleyi*
2. Similar head marks but anterior part of back with a vertebral series of butterfly-shaped black spots and smaller diamond-shaped ones on sides; posterior part of body similar.. *t. taeniura*

Elaphe taeniura ridleyi (Butler)

(Fig. 22)

Coluber taeniurus var. *ridleyi* Butler, Journ. Bombay, Nat. Hist. vol. 12, 1899, p. 426 (type-locality, Batu Caves, Kuala Lumpur, Malaya); Ridley, The Times, Nov. 10, 1937.

Coluber taeniurus: Boulenger, Fasciculi Malayenses, vol. 1, zool. 1, 1903, pp. 162-163 ("Goah Tanah, near Biserat, Jalor").

Coluber taeniurus pallidus: Rendahl, Ark. Zool. Stockholm, vol. 29, (A), 10, 1937, p. 19 (type-locality, Sukli, Tenasserim, Burma).

Elaphe taeniurus grabowskyi: (*part.*) M. Smith, Bull. Raffles Mus., Sinagpore, Straits Settlements, no. 3, Apr. 1930, pp. 49-50.

Elaphe taeniura: Smith, (*part.*), The fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese subregion; Reptilia and Amphibia, vol. 3, Serpentes. Dec. 1943, pp. 150-152.

Diagnosis: Anterior maxillary teeth larger than posterior. Head dull slate above with a black stripe through loreal region to jaw-angle; supralabials and infralabials generally yellowish. Anterior half of body light fawn, the neck region only a shade darker; near middle of body, dorsum and sides, except outer scalerow and adjoining half-row, with more dark pigment, continuing to grow from grayish slate to black except for a broad yellowish median line.

Description of subspecies (from No. 665 from Khao Kampan, Yala province, Thailand): Rostral wider than high not or scarcely visible from above; internasals tending to bend down slightly anteriorly, equal in size to about one half area of prefrontals which have a common suture nearly the length of the scales; frontal (9 mm. x 11 mm.) shorter than its distance from tip of snout, shorter than its distance to end of parietal; two nasals, subequal in size; loreal elongate, one-and-a-half times as long as high; two preoculars, lower small (subocular), upper large forming a suture with frontal; supraoculars subtriangular; parietals bordered by three temporals; two postoculars; temporals, two anterior, arranged $\frac{1+2}{1} + 3$ (4); supralabials, 9-9, three touching loreal, fifth and sixth bordering orbit; infralabials, 11-12, six touching first chin-shields which are a little wider but about same length as second pair.

Scale-formula: 32 (occiput), 29, 27, 19. Scales smooth on anterior part of body, becoming weakly then strongly keeled except on two or three outer rows which remain smooth throughout. Scales with paired apical pits. Body compressed posteriorly; venter with lateral keels; outer edge of ventrals turned upwards on side; keels not in evidence on neck and tail. Ventrals, 295; subcaudals, 114; anals, 2.

Color in life: Head dull slate above with a black stripe through loreal region and back of eye to jaw-angle; supralabials yellow except for first two or three, and upper edges of certain others; infralabials entirely yellowish; anterior half of dorsum yellowish fawn except outer part of ventrals; near middle of body pigment becomes evident, at first light lavender, then becoming darker lavender,

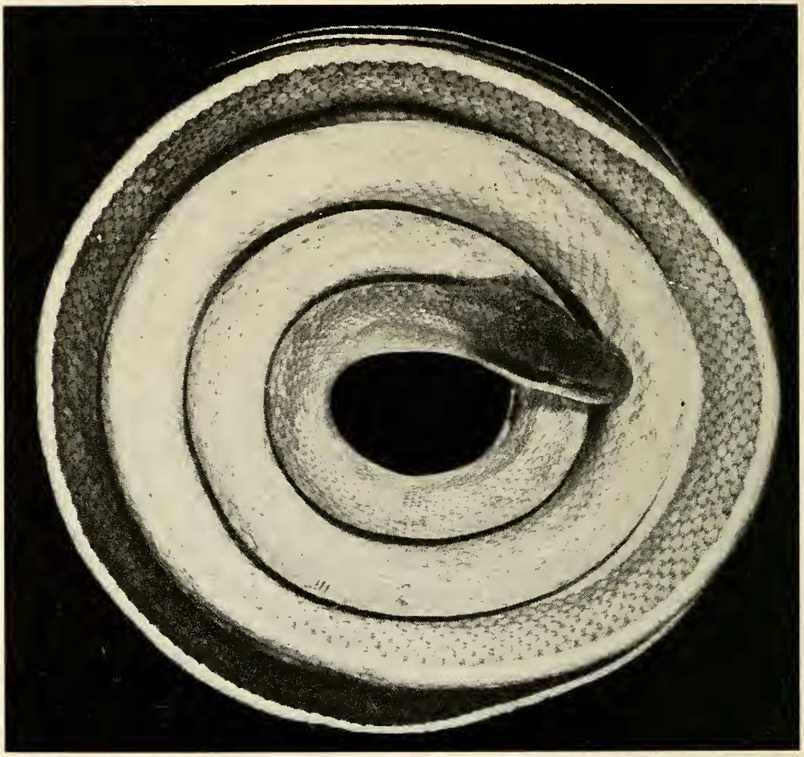

FIG. 22. *Elaphe taeniura ridleyi* (Butler). EHT-HMS No. 1627, Khao Kampan (Mt.) cave, Yala province, southern Thailand. Actual total length, 1852 mm.; tail, 370 mm.

purplish slate, and finally black towards end of tail; about midway, scalerow bordering lateral part of ventrals and half of adjoining scalerow develops a bright yellow stripe which includes outer edges of ventrals; below this a dorsoventral dark line on upturned part of ventrals continues to end of tail on outer part of subcaudals; a median yellow stripe begins on dorsum at about the middle of body and grows more intense, covering one whole and two half rows of scales, extending to tip of tail; venter yellowish; underside of chin ivory.

Measurements in mm. (No. 665 and an unnumbered specimen in the Boonsong Lekagul collection, both from same cave): Snout to vent, 1475, 1492; tail, 365, 390; total length, 1840, 1882; diameter of eye, 6, 7; eye to end of snout, 15, 15; width of head, 26.5, 32.6; length of head, 46.5, 50.

Variation: The second specimen has 286½ ventrals, 114 subcaudals; divided anal; supralabials, 9-9; infralabials, 11-12, five or six touching first chinshields. The color is nearly identical with that of the described specimen. Other head-scales are practically the same, except the temporals have a slightly different arrangement.

The variation in ventral and subcaudal counts is from 276 to 305; 89 to 112. The scalerows about the middle of the body are 25. While three supralabials normally border the orbit, the fourth may be separated only by a small subocular scale.

This form is usually very pale. Those found in the open are somewhat darker but presumably the normal habitat for this subspecies is in caves. All cave specimens I have seen are extremely uniform in color and markings.

Distribution: The pale *ridleyi* is known in Thailand in the southern part of the peninsular area. Specimens have been taken only from caves in Yala province.

The subspecies is also known from the limestone caves of northern Malaya, and it may be presumed that Rendahl's *taeniura pallidus* from Sukli, Tenasserim belongs here.

The Bornean form of *taeniura* has different anterior coloration and markings; also fewer ventrals and subcaudals than the peninsular form. This subspecies has been named *t. grabowskyi.*

Remarks: The specimen described is from a cave in Khao Kampan in this district of Yala. The first record is that of Boulenger from "Goali Tanali, near Biserat, Jalor." This place name seemingly is unknown to the area at the present time. The entire political geography has changed. The seven Pattani States have been divided into the present Changwats of Narathiwat, Pattani, Yala and Songkhla and it is not possible to state with certainty whether Jalor is wholly within the present province of Pattani or not.

I visited the Khao Kampan cave with Nai Prayoon Kananuracks. We obtained three specimens of this species. While here we came upon a *Dendrasphis hannah* (the king cobra) at a distance of more than 350 meters back from the mouth of the cave. I captured the specimen alive with some difficulty. It was presumed that the cobra was seeking the elaphid snakes for food.

Elaphe taeniura taeniura (Cope)

Elaphis taeniurus Cope, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 565 (type-locality, Ningpo and Siam).

Coluber taeniurus: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 333; Catalogue of the snakes in the British Museum, vol. 2, 1894, p. 47.

Elaphe taeniura: Pope, The Reptiles of China, 1935, pp. 271-277, fig. 58; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3; Serpentes, 1943 pp. 150-152 (*part.*).

Diagnosis: Anterior maxillary teeth largest; light brown above uniform on head and neck, except for a black stripe on each side of head, broadest behind eye; anterior part of back with a vertebral series of large black butterfly-shaped spots and smaller diamond-shaped spots on sides which tend to break up with age; posterior part of back with a gray vertebral stripe bordered by a broad black stripe on each side.

Description of species (type description): "Head slightly distinct, lanceolate, muzzle obtuse. Tail one-fifth the total length, flat beneath. Twenty-five rows of scales, those from the ninth to the sixteenth keeled. Rostral plate broader than high, the labial suture one-third the nasal, less than the prefrontal. Eight superior labials, fourth and fifth bounding the orbit. Seventh much longer than high, bounded above by a long temporal, and by a short one, which also bounds the eighth labial. Postoculars two, superior largest. Preoculars two, as in other species of the genus, the superior very large, its horizontal diameter greater than the length of the loreal. The latter plate much longer than high. Postfrontals large, bent upon the sides. Anterior border of the vertical [frontal] shorter than the straight convergent lateral; posterior angle obtuse. Superciliaries large. Occipitals [parietals] elongate, external borders convergent, bounded by two long temporals. Inferior labials ten, eleven, or twelve. Gastrosteges [ventrals] 232; one divided anal; urosteges [subcaudals] 101 pairs. Total length of specimen from Ningpo 64 in., tail 13 in.; specimen from Siam 30 in., tail 6 in., 3 lines."

Color: "Above, an olivaceous ash, or clay color, more olive anteriorly. A blackish lateral band extends from the tip of the tail, throughout the posterior third of the body, where it extends from the second to the ninth rows of scales, reducing the ground color to a dorsal stripe of three or four scales in width. It is divided by a number of irregular narrow vertical lines, at regular distances. The superior border is prolonged upon the anterior two-thirds of the body as an irregular, narrow, longitudinal black band, connected with that of the opposite side by similar short transverse bands at distances of four or five scales. Irregular black borders and centers of the median lateral scales, are the only indications of the inferior part of the lateral band anteriorly. Gastrosteges tipped with black anteriorly; the central parts become gradually darker posteriorly, but finally give place to a yellow median band which extends to the tip of the tail. This is bounded by a blackish band on each side, which is separated from that of the sides by another yellow one, which involves the tips of the gastrosteges, and first row of scales. The only marking upon the head is a black postocular vitta, which extends along the upper borders of the labials and no farther, parallel to the commissure of the mouth. Pectus, throat, chin, and superior labials yellowish."

Measurements in mm.: Total length of largest known female specimen, 1980 mm.; tail, 340.

Distribution: The typical form is known in Thailand from Chiang Mai province, and the Dong Rek mountains of central Thailand. Elsewhere it is known from Sikkim, Burma, Hong Kong and northern Indochina. It is probable that this typical form extends further south than my records show.

Variation: The loreal may be twice as long as high; and of the seven to nine supralabials, two or three (rarely one) bordering the orbit. A presubocular is usually present. The scalerow-formula is usually, 23, 23, 19. In northern Indochinese territory this may be, 25, 25, 19.

Elaphe radiata (Schlegel)

(Fig. 23)

Coluber radiatus Schlegel, Essai sur la physionomie des reptiles vol. 2, 1837, p. 135, pl. 5, figs. 5-6; (type-locality, Java); Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 333-334; Catalogue of the snakes in the British Museum, vol. 2, 1894, pp. 61-62; Wall, Journ. Bombay Nat. Hist. Soc., vol. 19, 1910, p. 825; *ibid.*, vol. 23, 1914, p. 206, fig.; *ibid.*, vol. 29, 1923, p. 621; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, 1914, p. 95, pl.—.

Caelognathus radiatus: Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 6.

Elaphe radiata: Pope, The reptiles of China, 1935, pp. 261-263, fig. 56; Bourret, Les serpents de l'Indochine, 1936, vol. 2, p. 211; Shaw, Shebbeare and Barker, Journ. Darjeeling Nat. Hist. Soc., vol. 14, 1939, p. 73; M. Smith, The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia; vol. 3, Serpentes; Dec. 1943, pp. 146-148, fig. 46.

Coluber quadrifasciata Cantor, Proc. Zool. Soc. London, 1839, p. 51, (type-locality, Assam).

Tropidonotus quinquefasciata Cantor, *ibid.*, 1839, p. 54 (type-locality, Mergui, Tenasserim, Burma).

Diagnosis: Large snakes reaching a length of two meters; a transverse black occipital bar making a median angle; scales in 19 rows at midbody; last labial below eye touching temporals; scales keeled; snout twice as long as eye; loreal longer than high; a median yellow or yellow-brown line bordered by a black stripe on each side.

Description of species (from No. 33630, Nakhon Ratchasima province near Mauk Lek (Sara Buri province): Rostral about twice as wide as high, well visible above, posterior border convex; internasals about as wide as long, the median common suture less than half as long as that between perfrontals; latter a little longer than wide; frontal longer than wide, slightly shorter than its distance from tip of snout; shorter than parietals; nostril between two nasals, posterior a little the larger; loreal longer than high; preocular reaches top of head but fails to form a suture with frontal; two postoculars, upper touching parietal; temporals, 2 + 2 + 3, the two anterior touching sixth labial; nine supralabials, fourth, fifth, and sixth bordering eye, eighth largest; mental small; ten infralabials, first five bordering first chinshields which are wider, but shorter than second pair.

Scalerows: 21 on neck; 19 at mid-body, 17, before vent; anterior scales smooth; then at first, five median rows, posteriorly seven or nine rows, lightly keeled; scales with paired apical "pits." Ventrals, 242; anal, single; subcaudals, 94. On sides a series of elongated black spots along third and fourth scalerows and a narrower series along outer scalerow and edge of ventrals; more posteriorly the upper row forms a continuous line.

Color in life: Top of head olive becoming brown on temples and neck (top and side). A black transverse occipital bar connecting with eye by two black lines running forward; laterally bar reaching to level of ventrals and continued back as a narrow zig-zag black line for a short distance; a line below eye crossing supra- and infralabials; a diagonal black line from eye across back of mouth; a median clay-colored stripe, nearly three scales wide begins on occiput or near it, and runs back two thirds length of body; after a short distance this stripe, flanked by two broad black stripes varying from two to three or four scales wide at intervals, gradually narrows posteriorly, becoming brown about middle of body and is finally lost in the ground color; posterior part of body nearly uniform brown, median part slightly lighter; tail light brown, unicolor on top and sides; chin and ventral surface of neck dirty ivory for about

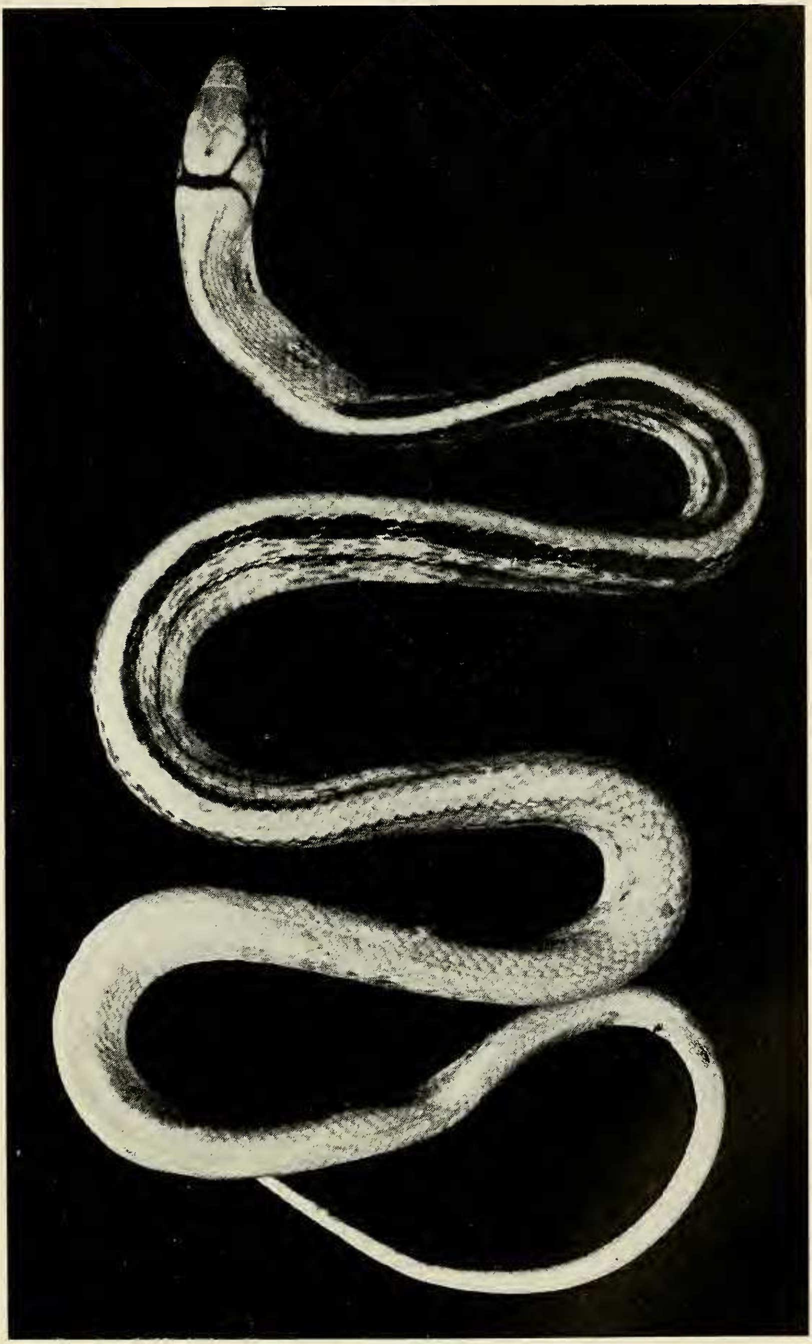

FIG. 23. *Elaphe radiata* (Schlegel). No. 404 ♀, Ratapoom, Songkhla province, southern Thailand. Actual total length, 542 mm.; tail, 99 mm.

16 centimeters; ventrals then begin to acquire gray pigment which becomes denser but lightens again near tail; subcaudal area uniform yellow-cream.

Measurements in mm.: Total length, 1440; snout to vent, 1163; tail 277; width of head, 20; length of head, 30.

Variation: Ventrals vary between 222 and 250, the subcaudals from 82 to 108. Rarely there are eight supralabials and occasionally there are but 19 scalerows around neck.

There is some variation in the coloration. Occasionally the body may have a reddish cast, but the pattern of the markings is relatively constant.

Distribution: The species occurs throughout Thailand in the lowlands, specimens having been taken in almost all areas where collections have been made.

Outside Thailand the species ranges from Orissa and Sikkim in India—east and south to southern China, Indo-China, Malaya and the Indo-Australian Archipelago.

Remarks: It feeds largely on small mammals frequenting the rice field. The juvenile figured is No. 404 from Ratapoom, Songkhla.

Elaphe porphyracea (Cantor)

Coluber porphyraceus Cantor, Proc. Zool. Soc. London, 1839, p. 51 (type-locality, Mishmi Hills, "Asam" Abor country).

Two subspecies are recognized, the typical one entering our territory in the northwestern part.

Elaphe porphyracea porphyracea (Cantor)

(Fig. 24)

Coluber prophyraceus Cantor, Proc. Zool. Soc. London, 1839, p. 51 (type-locality, Mishmi Hills, Assam, Abor country); Günther, The reptiles of British India, 1864, p. 239, pl. 20, fig. J; Boulenger, Catalogue of the snakes in the British Museum, vol. 2, 1894, p. 34; Annadale, Journ. Asiat. Soc. Bengal, 1905, p. 175; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 326; *ibid.*, vol. 19, 1909-1910, pp. 345, 827; *ibid.*, vol. 29, 1923, p. 620; *ibid.*, vol. 30, 1925, p. 812; Rendahl, Ark. Zool. K. Sven. Vet. Akad. Stockholm, vol. 29, A, 1937, p. 16.

Ablabes prophyraceus: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 308; Sclater, List of the snakes in the Indian Mus., 1891, p. 19; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1901, p. 611; Venning, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910, p. 337; Annandale, Rec. Ind. Mus., 1911, p. 217; *ibid.*, 1912, pp. 37, 47, 53.

Elaphe porphyracea: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 48; Pope, The reptiles of China, 1935, pp. 253-257, fig. 55; Bourret, Les serpents de l'Indo-Chine, 1936, p. 187; Shaw, Shebbeare, and Barker, Journ. Darjeeling Nat. Hist. Soc., vol. 14, 1939, p. 72; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 154-156, fig. 47.

Elaphe porphyracea prophyracea: M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 480.

Coronella callicephalus Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 12, 1853, p. 390 (type-locality, Khasi Hills).

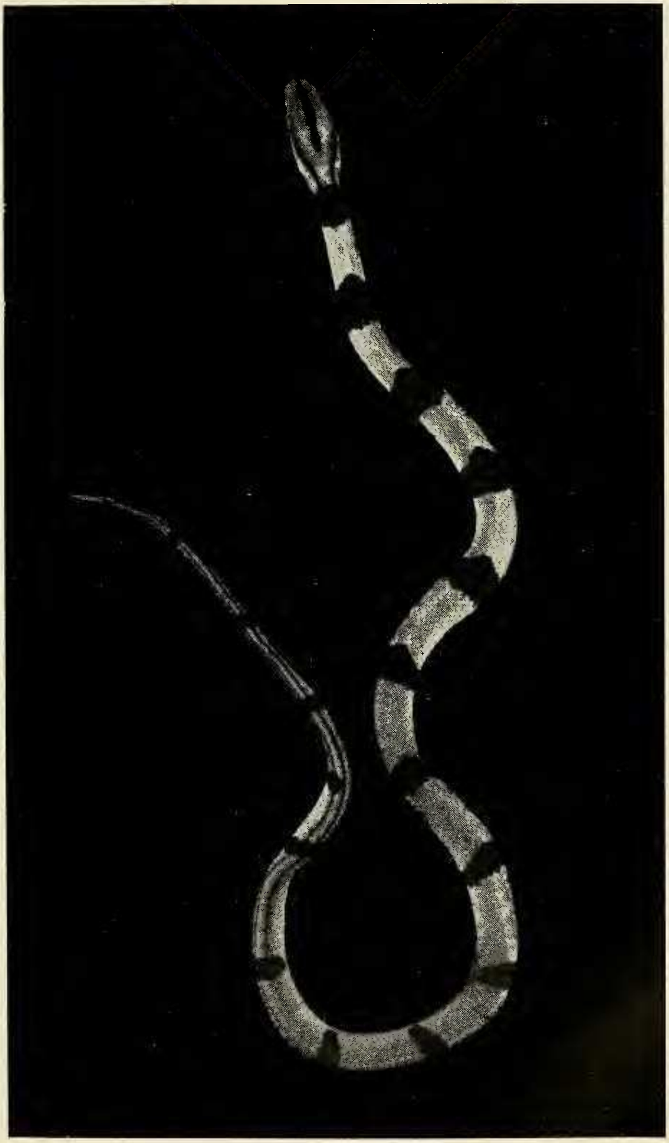

FIG. 24. *Elaphe porphyracea porphyracea* (Cantor). No. 36526, Doi Suthep, near Chiang Mai, Chiang Mai province, northern Thailand. Actual total length, 307 mm.; tail, 51 mm.

Diagnosis: Somewhat exceeding a meter in length (1100 mm.); scales smooth in 19 rows; loreal present; above reddish to magenta with a series of about 14 to 16 darker bands on body; two lines from first band extended forward along sides of head to eye; a median stripe on head; two dorsolateral black lines on posterior third of body and tail, a total of four darker bands indicated on tail.

Description of species (from No. 20926, Mae Hong Son): Rostral nearly one-half wider than high, well visible above; internasals subquadrangular, about half area of prefrontals; frontal as long as its distance from tip of snout, little shorter than parietals; parietals bordered behind by four scales; nostril between two nasals, posterior one largest; loreal present, considerably longer than high; preocular large, reaching top of head but separated from frontal; two postoculars, both touching parietal; temporals, 1 + 2, anterior touching only lower postocular; eight supralabials, fourth and fifth border eye; ten infralabials, first five border first chinshieds which are larger than second pair.

Scale-formula: 23 (occiput), 19, 19, 17. Scales smooth throughout. Ventrals, 214; subcaudals, 66; anal single. Maxillary teeth, 20-21, anterior ones largest.

Color in life: Above dull red to magenta with dark-edged cross-bars, centers of which are practically same shade as body intervening areas double or triple length of cross-bars; two narrow black lines extend straight forward to eyes from first bar; median black line on head from anterior edge of frontal to end of parietals; black edges of cross-bars bordered with lighter color at least anteriorly. Ventrals and subcaudals ivory-white except on outer edges; chin ivory-white; supralabials and top of head grayish brown; a pair of dorsolateral black lines begin at about 12th cross-bar, extending backwards.

Measurements in mm. (Nos. 20926 and 36526): Total length, 983, 307; tail, 156, 51; width of head, 16, 6.7; length of head, 28.5, 14.4.

Variation: The young specimen, No. 36526, is from Doi Suthep, collected by O. Gordon Young. The bands are coal black, 14 in number on body, and four on tail; the dorsolateral bands begin on the twelth bar.

There are nine supralabials (the third being divided probably abnormally, thus the fifth and sixth border eye). The second pair of chinshields are transversely divided leaving three pairs of chinshields. Ten lower labials present, the median stripe on head reaching to the internasals. The first temporal touches neither of the postoculars but both touch the parietal. The ventrals are 208, subcaudals, 69; the anal is divided.

The known ventral range is 190 to 218; the subcaudal range, 52 to 76.

Distribution: The snake has been taken only in northern Thailand in mountains. It is known from the provinces of Mae Hong Son, and Chiang Mai.

Outside of Thailand the species occurs in the Eastern Himalayas, Assam, Burma, Yunnan, west China, northern Malaya, and Sumatra. No specimens have been reported between Doi Suthep, Chiang Mai and the Cameron Highlands (4500 ft. elev.) in northern Malaya.

Elaphe flavolineata (Schlegel)

(Fig. 25)

Coluber flavolineata Reinwardt, Bull. Sci. vol. 9, 1826, p. 237 (*nom. nud.*); Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 141 (type-locality, Java); Stejneger, Nyt. Mag. Naturvid. Kristiana, vol. 60, 1922, (2), p. 78.

Coluber melanurus (*non* Shaw 1802) Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 141, pl. 5, figs. 11, 12 (type-locality Java); Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 334; Catalogue of the snakes in the British Museum, vol. 2, 1894, pp. 60-61; Annandale, Journ. Asiat. Soc. Bengal, new series, vol. 1, 1905, p. 173; M. Smith, Journ. Nat. Hist. Soc. Siam., vol. 2, no. 2, 1916, pp. 160-161; Wall, Journ. Bombay Soc. Nat. Hist., vol. 29, 1923, p. 261. M. Smith, Bull. Raffles Mus., no. 3, 1930 p. 48.

Composoma melanurum: Günther, The reptiles of British India, 1864, pp. 244-245.

Elaphe melanurus: Barbour, Mem. Mus. Comp. Zool., Harvard Coll. vol. 44, 1912, p. 117; Sworder, Singapore Nat., no. 2, 1922, p. 63, (Singapore).

Elaphe flavolineata: M. Smith, Bull. Raffles Mus., no. 3, Apr. 1930, p. 48; The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 148-149.

Diagnosis: A large snake reaching approximately one-and-one-half meters in length; color black and yellowish brown; loreal not particularly small; the last labial touching eye also in contact with temporal scales; scales on posterior two thirds of body strongly keeled; scales in 19 rows; ventrolateral spots on anterior part of body; two dark spots radiating below eye; no transverse bar on neck; posterior part of body and tail (above and below) black; a pair of dorsolateral black lines on anterior part of body.

Description of species (from EHT-HMS No. 9. Kuala Lumpur, Malaya): Rostral one-and-one-third times as wide as high, very narrowly visible above; internasals as wide as long, much smaller than prefrontals, little wider than long; frontal scarcely angulate anteriorly, nearly triangular, its length equal to its distance from rostral, equal to common parietal suture but shorter than parietal scutes; nasal divided, posterior part largest; loreal longer than high; one large preocular reaching upper side of head but not touching frontal; two postoculars; temporals, 2 + 2, both anterior temporals touching sixth labial; supralabials, 9-9, fourth, fifth, and sixth bordering orbit; mental small, its labial border much less than that of rostral; infralabials, 10-11, six touching first pair of chinshields which are larger, but approximately same length as second pair.

Scale-formula: 21, 19, 17; anteriorly 11 rows keeled, 17 rows more posteriorly; outermost row unkeeled throughout. Ventrals, 227, somewhat angulate laterally; anal, single, subcaudals, 104.

Color: Head above and on sides uniform olive-brown; supralabials yellow-ivory except along their upper edges; a blackish bar below eye extending across infralabials; a diagonal black bar from eye across supralabials terminating on the eighth; a black stripe from posterior temporals to first ventrolateral black spot on ninth and tenth ventrals; at level of twentieth ventral, a pair of dorsal black stripes begin, separated mesially by three scalrows, the stripes two scalerows wide; these continue back to about level of the one hundredth ventral; area between black stripes yellow-brown; from the termination of the lines the brown of back gradually darkens to black continuing so to end of tail. Anteriorly on outer edge of ventrals a series of twelve black spots, often extending onto first scalerow; above these on side a lighter area, then a short black mark with another lighter area between this and the black dorsal stripe.

The light areas associated with black spots extend onto the skin between scales.

Measurements in mm.: Snout to vent, 1095; tail, 324; total length, 1419; width of head, 17; length of head, 31.5.

Variation: Ventrals vary between 193 and 234; subcaudals, 89 and 115. The young may have ocelli with bright yellow centers associated with the black spots. The scales about neck may be in 21 or 19 rows.

Distribution: In Thailand the species has been found only at "Bangnara" [= Narathiwat], in the province of that name.

The species is widespread occurring in the Indo-Australian Archipelago, Malaya, Nicobar Island, Andaman Islands and Burma. I have not found it in Thailand, and I use a Malayan specimen for the description.

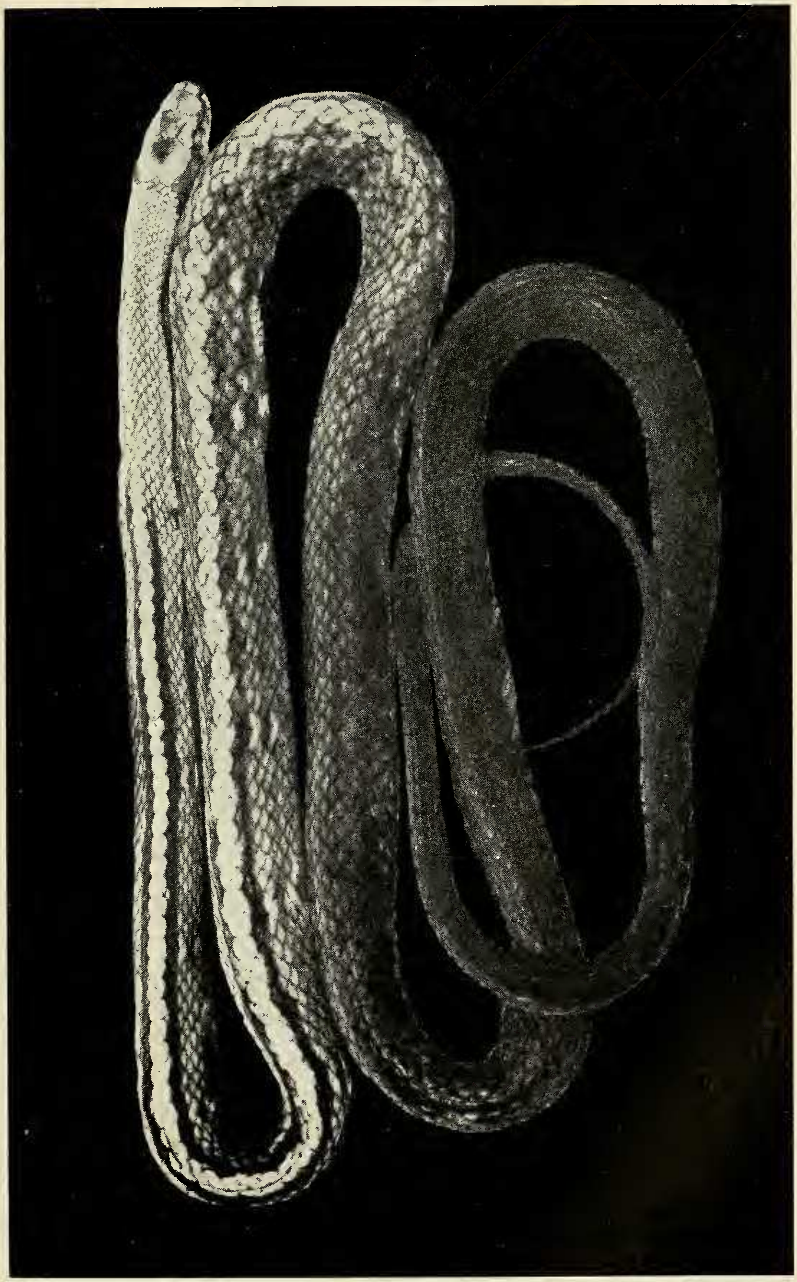

FIG. 25. *Elaphe flavolineata* (Schlegel). EHT-HMS No. 9, Kuala Lumpur, Selangor, Malaya. Actual total length, 1419 mm.; tail, 324.

Genus *Ptyas* Fitzinger

Ptyas Fitzinger, Systema Reptilium, 1843, p. 26 (type of genus, *blumenbachii*).

Zamenis Gagler, Natürliches System der Amphibien 1830, p. 188 (type of genus *Aesculapii* Lacépède [non Linnaeus] "Aescaulapechlange").

Dignosis: Large snakes, with head distinct from the more or less cylindrical body; eye large to very large, the pupil round; scales in 17-15 rows (more rarely 18, 16, 14); subcaudals, paired; apical pits present; normally two or three loreals; a presubocular usually present.

Maxillary teeth, 20 to 28, increasing slightly in length and thickness posteriorly.

Three species occur in Thailand. They are large, conspicuous snakes that move very rapidly on the earth, and at least one is a good tree climber. They may be separated by the following key:

KEY TO SPECIES OF *Ptyas* IN THAILAND

1. Number of scalerows never in even numbers; scales in 15 rows at middle of body; ventrals less numerous, 160-187 subcaudals, 120-147; young with white bands; adults showing lineation in posterior part of body.....*korros*

   Scalerows often even or at least so in posterior part of body.......... 2

2. Scales in 17 or 16 rows at middle of body; ventrals more numerous 190-213, subcaudals, 100-146; darker bands at least in posterior part of the body, that may be somewhat reticulated or not; labials and neck scales with black sutures.....................................*mucosus*

   Scales only in even number of rows, 16 or 14 rows at middle of body, the median rows (four or six) keeled; ventrals, 200-215, subcaudals, 110-118, yellowish brown on posterior part of body with six black irregular longitudinal stripes tending to form a reticulation.................*carinatus*

Ptyas korros (Schlegel)

(Figs 26, 27)

Coluber korros Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 139; Abbildungen . . . Amphibien, 1840, p. 99, pls. 27-28, figs. 1-6 (type-locality, Java); Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 121.

Ptyas korros: Günther, The reptiles of British India, 1864, p. 250; Theobald, Journ. Linn. Soc., Zoology, vol. 10, no. 41, May, 30, 1868, p. 46. Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 54, 65; Sclater, Hand list of the snakes in the Indian Museum, 1891, p. 26; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 94, 187; *ibid,* vol. 6 pt. 3, 1915, p. 213; *ibid,* vol. 2, 1916, p. 16 (Pattani, Nakhon Si Thammarat); Sworder, Singapore Nat., vol. 2, 1922, p. 62; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, no. 2, 1923, p. 202; Kopstein, Treubia, vol. 11, 1930, p. 301, fig.; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 47; Pope, The reptiles of China, 1935, pp. 217-220; Taylor, Proc. Acad. Nat. Hist. Soc. Philadelphia, vol. 86, 1936, p. 305 (Chantaboon = Chanthaburi, Chanthaburi province); Bourret, Les serpents de l'Indo-Chine, 1936, p. 176; Shaw, Shebbeare, and Barker, Journ. Darjeeling Nat. Hist. Soc., vol. 14, 1939, p. 71; M. Smith, The Fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 162-163; Tweedie, The snakes of Malaya, 1954, p. 43, fig. 8 (Second Ed., 1957); Taylor and

Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1136 (Chaiyaphum and Kalasin provinces).

Zamenis korros: Boulenger, The fauna of British India, Ceylon, and Burma, Reptilia and Batrachia, 1890, p. 324; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, pp. 384-385; *ibid,* vol. 3, 1896, p. 621, in Addenda; Flower, Proc. Zool. Soc. London, 1899, p. 666; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900-1901, p. 353, 620; Wall, *ibid,* vol 18, 1908, p. 326; *ibid,* vol. 19, 1909, pp. 345, 622; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 137; Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 618.

Ptyas korros chinensis Mell, Sitz. Ber. Ges. Nat. Freunde, Berlin, 1930, p. 320 (type-locality, Yao-shan, Kwangsi, China).

Ptyas korros indicus Mell, Lingnan Sci. Journ., vol. 8, p. 208 (type-locality SW Yunnan, China).

Liopeltis libertatis Barbour, Proc. Biol. Soc. Washington, vol. 23, p. 169 (type-locality, Buitenzorg, Java); Dunn, Amer. Mus. Novitates, No. 287, 1927, p. 1.

Diagnosis: Large snakes reaching a length of at least two meters; young gray on anterior half of body with dotted blue-white transverse bars, tending to disappear in older individuals which become nearly uniform brown or gray-brown anteriorly; scales may be slightly edged with white; farther back this white portion widens forming eleven pale longitudinal lines, separated by brownish or grayish lines.

Three (two) loreals; one presubocular; scalerows: 15, 15, 11; ventrals, 160-187.

Description of species (from No. 34162 ♀ Bangkok): Rostral wider than high, narrowly visible above; internasals about two thirds area of prefrontals; latter scales touching two (one) loreals laterally; frontal longer than wide, longer than its distance from end of snout, as long as parietals; nasal divided, anterior portion the largest, anterior edge of posterior part deflected downward; three (two) loreals; large preocular reaching top of head but not touching frontal; supraoculars forming a slight shelf above eye and preocular region; small presubocular wedged between third and fourth supralabials; two postoculars, upper largest; temporals, 2 + 2 + 2, upper anterior touching both postoculars; supralabials eight, fourth and fifth bordering eye; infralabials ten, first five touching first chinshields which are smaller than second pair; latter scales touch each other anteriorly, separated by two scales posteriorly; eye large, its length equal to its distance from nostril. Scale-formula: 20 (occiput), 15, 15, 11, scales smooth. Ventrals, 170; subcaudals, 104; anal, divided.

Color: Head and anterior part of body gray-brown (bluish gray when epidermis is shed); scales with grayish-white edges, at first

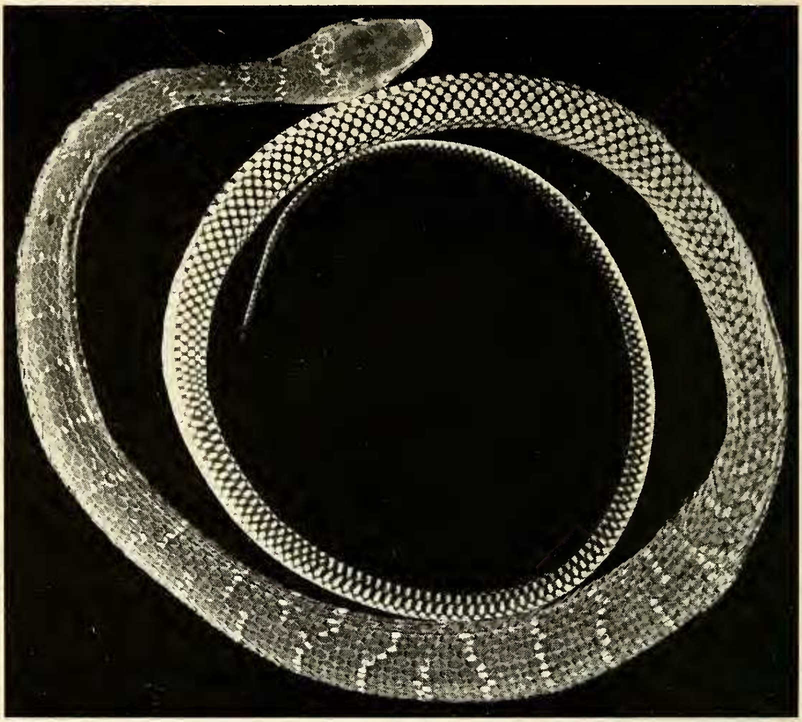

FIG. 26. *Ptyas korros* (Schlegel). No. 33310 young, Muak Lek, Sari Buri province, central Thailand. Actual total length, 593 mm.; tail, 211 mm.

scarcely noticable but farther back light edges of two scalerows make pale lines that widen posteriorly and are separated by lines of brownish ground color; farther back this dark color becomes black, concentrated chiefly in a single median posterior spot on the scale with a slightly darker edging; major part of each scale on posterior fifth or sixth of body and on tail, ivory-white; labials, chin, and ventral surface brownish white to nearly ivory; white posteriorly in subcaudal region; sides and tip of snout whitish.

Measurements in mm.: Total length, 1402; tail, 443; width of head, 19; length of head, 35.

Distribution: The species occurs throughout Thailand in lowlands. It has been taken in the provinces of Yala, Trang, Narathiwat, Pattani, Phattalung, Nakhon Si Thammarat, Bangkok, Sara Buri, Khorat, Chaiyaphum, Kalasin, Chiang Mai and Chon Buri.

Outside of Thailand the species ranges in Assam and Burma, Laos, South China, Cambodia, Malaya, Sumatra, Java, and Borneo.

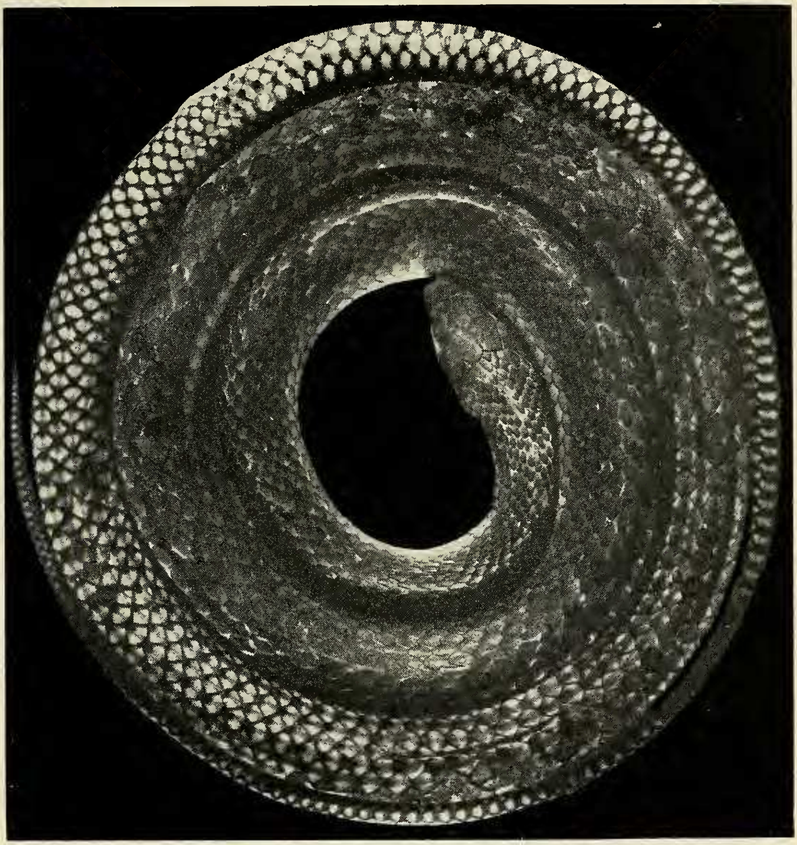

FIG. 27. *Ptyas korros* (Schlegel). No. 34162, Bangkok (city). Actual total length, 1402 mm.; tail, 443 mm.

Remarks: This large snake is one that is frequently mistaken for the King Cobra. Needless to remark, the species is entirely harmless, feeding largely on frogs, rats, and other small rodents and occasionally on other reptiles and birds.

They are often seen in bushes and low trees especially in the neighborhood of water. They remain quiet and one may approach quite close to them if the approach is quiet and slow. When in grass the head may be raised thus looking even more like the Hamadryad.

The young have numerous narrow whitish bars and look very different from the adults.

The species lays eggs, usually not more than twelve. When hatched, the young measure about 375 millimeters in length.

Ptyas mucosus (Linnaeus)

(Fig. 28)

Coluber mucosus Linnaeus, Museum Adolphi Friderici Regis, vol. 1, 1754, p. 37, pl. 23; Systema naturae, ed. 10, 1758, p. 226 (type-locality, India) based on Russell, An account of Indian serpents collected on the coast of Coromandel, vol. 1, 1796, p. 40, pl. 34; Andersson, K. Sven. Vet-Akad. Handl. Stockholm, vol. 24, 1899, p. 25.

Zaocys mucosus: Wall, Journ. Bombay Nat. Hist. Soc., vol. 23, p. 168; *ibid.*, vol. 26, p. 566; Spolia Zeylanica, 1921, p. 399.

Ptyas mucosus: Günther, The reptiles of British India, 1864, p. 249; Theobald, Journ. Linn. Soc. vol. 10, no. 41, Zoology, May 30, 1868, p. 46; Blanford, Proc. Zool. Soc. London, 1881, p. 221; Tirant, Notes sur les reptiles et les Batraciens de la Cochinchine et du Cambodge, 1885, pp. 54, 55, 65; Wall, Ophidia Taprobanica or the snakes of Ceylon, 1921, pp. 172-190, fig. 40; Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 617; Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, (1), 1924, p. 169; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, no. 2. Oct. 1923, p. 202 (Hainan); M. Smith, Bull. Raffles Mus. no. 3, 1930, p. 47; Subrahmaniam, Journ. Bombay Nat. Hist. Soc., vol. 37, 1934, p. 743; Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, pp. 304-305 (Chiang Mai); Pope, The reptiles of China, 1935, pp. 220-223; Fraser, Journ. Bombay Nat. Hist. Soc., vol. 29, 1937, p. 475; Shaw, Shebbeare and Barker, Journ. Darjeeling Nat. Hist. Soc., vol. 14, 1939, p. 68; Taylor, Univ. Kansas Sci. Bull., vol. 33, pt. 2, Mar. 20, 1950, pp. 543, 544 pl. 15, fig. 1; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1135 (Nakhon Pathom province).

Zamenis mucosus: Boulenger, The fauna of British India, including Ceylon and Burma, Reptilia and Batrachia, 1890, p. 324; Catalogue of the snakes in the Bristish Museum, 2nd Ed., vol. 1, 1893, pp. 385-386; Ferguson, Journ. Bombay Nat. Hist. Soc., vol. 10, 1895, p. 71; Beadon, *ibid.*, vol. 20, 1910, p. 228; Millard, *ibid.*, vol. 17, 1906, p. 245; Venning, *ibid.*, vol. 20, 1910, p. 339; Millet, *ibid.*, vol. 19, 1909, p. 758, 759; Fenton, *ibid.*, vol. 19, 1910, p. 1002; Wall, Journ. Bombay Nat. Hist. Soc., vol. 17, 1906, p. 259, pl. 3; *ibid.*, 17, 1907, p. 259, *ibid.*, vol. 18, 1907, p. 113; *ibid.*, vol. 19, 1909, p. 622; *ibid.*, vol. 21, 1911, p. 134; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 137-138; Nikolski, Faune de la Russie, vol. 2, 1916, p. 79; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 98; McCann, Journ. Bombay, Nat. Hist. Soc., vol. 38, 1935, p. 409; Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, pp. 304-305 (Chiang Mai prov.); Bourret, Les serpents de l'Indochine, 1936, p. 178.

Zaocys mucosus: Wall, Journ. Bombay Nat. Hist. Soc., vol. 23, 1914, p. 168; *ibid.*, vol. 26, 1919, p. 566.

Coluber blumenbachii Merrem, Tentamen systematis amphibiorum, 1820, p. 119 (type-locality, Bengal).

Coluber dhumna Cantor, Proc. Zool. Soc. London, 1839, p. 51 (type-locality, "Carnatic Orissa, Bengal, Nepal, Asám, Arracan, Tenasserim").

Leptophis trifrenatus Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 503 (type-locality, Hong Kong).

Diagnosis: Large snakes bearing a superficial resemblance to the king cobra and to the large rat snake *Ptyas carinatus;* "reaching a length of 11 ft. 9 in."

Scales usually in 17 (or 16) rows; ventrals, 190-213; subcaudals, 121-146. Maxillary teeth, 20-25, more or less subequal; sutures of supralabials and infralabials blackish, with numerous blackish marks

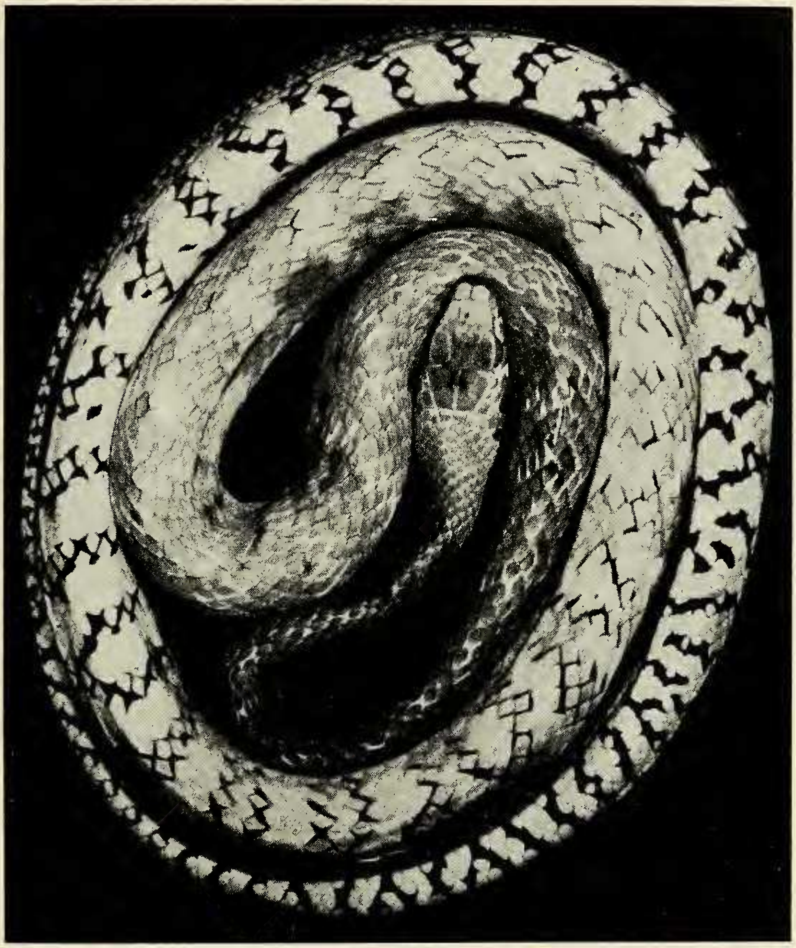

FIG. 28. *Ptyas mucosus* (Linnaeus). No. 17, Bangkok (city), Thailand. Actual total length, 1702 mm.; tail, 439.5 mm.

on chin and forepart of neck (ventral); narrow irregular dark-brown bands on posterior part of body.

Description of species (from No. 34165, Bangkok): Rostral wider than high, narrowly visible above; internasals longer than wide, of about half area of prefrontals; latter bordering two loreals, wider than long, the sides bent down; frontal as long as wide, distinctly shorter than its distance from rostral; only very slightly shorter than parietals; latter scales about a fourth longer than wide; nasal divided, anterior part largest, posterior part with its anterior edge deflected downwards; three small loreals; two preoculars, upper large, its upper part reaching top of head and with supraoculars forming a small projecting shelf above and in front of eye; two postoculars; temporals, 2 + 2; supralabials, 8-9, the fourth and fifth bordering eye; ten infralabials, five bordering first pair of chinshields which are distinctly shorter than second pair; latter in contact anteriorly, separated by one or two small scales posteriorly.

Scale-formula: 24 (occiput), 21, 17(16), 14, smooth with paired apical pits. Ventrals, 197; subcaudals, 117; anal, divided.

Color: Head dark brown above (with epidermis removed, fawn to gray); snout yellowish; labials yellowish with black sutures on both supra- and infralabials; scales on neck and anteriormost ventrals similarly marked; body amber to brown, latter three fourths of body with narrow irregular bands or alternating broken bands on top and sides of body, passing on to venter but not crossing it (sometimes forming a reticulum above); numerous brownish spots on underside of posterior ventrals and subcaudals; venter light yellowish brown anteriorly, growing more yellowish posteriorly; subcaudals yellowish ivory.

Measurements in mm.: Total length, 1753; tail, 463; width of head, 28; length of head, 47.

Distribution: Found widely distributed in Thailand. Outside of Thailand the range extends from Transcaspia east through India, Ceylon to Indochina, and Malaya.

Remarks: This species is somewhat less common than *Ptyas korros,* and when specimens are found with the scalerows 16 and 14 it is difficult to distinguish them from *Ptyas carinatus* which likewise has an even number of scalerows and three loreals. Moreover, *mucosus* may have the median scales keeled. Under these circumstances the color differences will serve to distinguish them.

Ptyas carinatus (Günther)

Coryphodon carinatus Günther, Catalogue of the colubrine snakes in the collection of the British Museum, 1858, p. 112 (type-locality, Borneo).

Zaocys carinatus: Günther, The reptiles of British India, 1864, p. 256 (footnote "Our largest example is nearly 10 feet long, the tail being one-fourth"); Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 377, pl. 27, fig. 1; Ann. Mus. Civ. Genova, ser. 2, vol. 13, 1893, p. 324; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 135-136; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 160 ("Patani," Nakhon Si Thammarat, "Northern Siam"); de Rooji, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 73 (Malay Peninsula, Sumatra, Java, Borneo); Sworder, Singapore

Nat., no. 2, 1922, p. 62, (Singapore); Joynson, Journ. Nat. Hist. Soc. Siam, vol. 6, 1927, p. 314; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 46; Bourret, Les serpents de l'Indochine, 1936, p. 173, fig.; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 164-165.

Ptyas carinatus Wall, Journ. Bombay Nat. Hist. Soc., vol. 31, 1926, p. 562.

Diagnosis: Maxillary teeth, 22-26; internasals two thirds of the length of prefrontals; two to four loreals; eight to ten supralabials, fourth and fifth or fifth and sixth bordering orbit. Scale-formula: 18, 16 (14), 12; four to six median scalerows keeled.

Description of species: Rostral broader than high narrowly visible from above; internasals shorter than prefrontals; frontal somewhat longer than broad about as long as its distance from tip of snout, shorter than parietals; parietals a little longer than broad; supraoculars about as wide as frontal; nasal divided, anterior part a little the larger; loreals, two (three or four rarely); a preocular reaching top of head but not touching frontal; two postoculars; temporals, 2 + 2; supralabials nine, fifth and sixth border orbit; infralabials eleven, five bordering anterior chinshields which are distinctly shorter than posterior.

Scalerows: 18, 16 (14), 12, four to six median scalerows with keels: ventrals, 208-215; subcaudals, 109-117; anal, divided.

Color: Olive-brown to blackish on anterior part of body with more or less distinct cross-bands and yellowish-fawn spots; gradually ground color becomes buff-brown or yellowish brown posteriorly with a large black network; underside of head and venter yellowish anteriorly, black and yellowish posteriorly.

Measurements in mm.: Total length, 3000; tail, 750.

Variation: The ventral and subcaudals show rather a limited amount of variation; for the ventrals, 208-215; for subcaudals, 110-118. Supralabials vary from eight to ten, and the number of loreals may be two, three, or four.

Distribution: The species occurs widely in Thailand, specimens being known from Lampang (Me Pow Forest, 20 mi. E. of Muang Ngow); Chiang Mai, Nakhon Si Thammarat, Pattani (or Yala). Outside of Thailand the species ranges through Malaya, Singapore, Borneo, Java, Sumatra, to Palawan (Philippines).

Remarks: This is not a rare snake but many specimens taken fail to preserve well because of their size and consequently are discarded. The snake is used much for food.

This species has long been retained in the genus *Zaocys.* The definitions of the two genera *Ptyas* and *Zaocys* are very similar and the similarity between *Ptyas korros, Ptyas mucosus,* and *Zaocys carinatus* is such that it seems well to place them together. The chief difference in the genera was presumed to be that *Zaocys* had an even number of scalerows, and *Ptyas* an uneven number. It has been found that *Ptyas mucosus* very frequently may have the scalerows in even numbers throughout a part or even over very much of the body. In *Ptyas korros* there is an odd number of scalerows.

Thus it would appear that *Ptyas mucosus* breaks down the essential distinction that would warrant separation and a recognition of two genera. In consequence I follow Wall, *loc. cit.* in making *Zaocys* a synonym of *Ptyas,* the older name. Malcolm Smith has maintained them as separate genera.

Genus *Lycodon* Boie

Lycodon Boie, *in* Ferussac's, Bull. Sci. Nat., vol. 9, 1826, p. 238 (*part.*); Fitzinger, Neue Classification der Reptilien, 1826, pp. 29, 30 (type of genus, *Lycodon aulicus*). M. Smith, Fauna British India . . . Serpentes, 1943, pp. 255-257, fig. 88.

Ophites Wagler, Natürliches System der Amphibien, 1830, p. 186, (type of genus, *O. subcinctus*).

Diagnosis: Small snakes not reaching one meter in length (except *subcinctus*). Head distinctly flattened, slightly distinct from body; eye with vertically elliptic pupil; body rather short; scales usually in 17 rows (one species 15, one 19 rows), with apical pits; some forms with lateral keels on ventrals; subcaudals (except in one Indian species) paired. Hypapophyses absent on posterior vertebrae. Maxillary arched with three or four small teeth preceding two enlarged teeth, then a curving diastema followed by 7 to 15 teeth, of which the last two are enlarged; nostril between two nasals, or nasal only partially divided; loreal in contact with internasal or not, the scale elongated; three supralabials, third, fourth, and fifth bordering eye; anal normally divided.

The genus is distributed from Transcaspia throughout the Oriental Region, south through Malaya and the Indo-Australian Archipelago.

Approximately 20 species are known, four of which occur in Thailand. They may be differentiated by the following key:

KEY TO THAI SPECIES OF *Lycodon*

1. No preocular present; prefrontal and loreal border eye; scales feebly keeled; one anterior temporal; posterior nasal higher than anterior; usually eight supralabials; ventrals 197-230 . . . . *s. subcinctus*

A preocular separating prefrontal from eye; loreal separated from border of eye, or not; scales smooth or keeled.

2. Snout not projecting beyond lower jaw; loreal usually just touching or separated from internasal: two anterior temporals; nine supralabials; first chinshields two to three times size of second pair .... *laoensis*
   Snout projecting beyond lower jaw.
3. Scales smooth; ventrals strongly angulate; nasals subequal; loreal in contact with internasal, not touching eye; a white or yellow nuchal band, speckled with lavender; body reticulated with lavender and fawn . . *capucinus*
   Median scalerows feebly keeled; ventrals feebly angulate; posterior nasal larger than anterior; loreal borders eye, well separated from internasal; no white or yellow nuchal band; numerous transverse light and dark bands, the dark ones becoming narrower posteriorly .... *fasciatus*

Lycodon subcinctus subcinctus Boie

Lycodon subcinctus Boie, Isis, 1827, p. 551 (Based on Russel, Indian Serpents, vol. 2, 1801, p. 44, pl. 41, (type-locality, Java); Boulenger, Catalogue of the snakes in the British Mus., vol. 1, 1893, pp. 359-360; Flower, Proc. Zool. Soc. London, 1899, p. 665; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 133-134; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 108, 109, fig. 45; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 160 (Pattani); Sworder, Singapore Nat., no. 2, 1922, p. 62; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, p. 202; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 46 (Gunong Tahan, Malaya, 5400 ft.).

Ophites subcinctus: Günther, The reptiles of British India, 1864, p. 322; Blanford, Proc. Zool. Soc. London, 1881, p. 222, pl. 21, fig. 2; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, p. 46; Bourret, Les serpents de l'Indo-chine, 1936, p. 157; Pope, Reptiles of China, 1935, pp. 196-197, fig. 45 (head); Herklots, Hong Kong Nat., vol. 6, 1935, p. 195, fig. (head).

Elapoides annulatus Sauvage, Bull. Soc. Philom., ser. 7, vol. 8, p. 144 (type-locality, Sumatra).

Lycodon platurinus Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 916.

Diagnosis: Scales in 17 rows; no preocular present, permitting both prefrontal and loreal to border eye; scales feebly keeled; young with 10-13 broad purplish-black bands separated by white crossbars; white bars lost in posterior part of body in adult specimens, and only a trace of the white remains in old specimens. Reaching a length of one meter.

Description of species (from No. 35656, Tonka Harbor Tin mine, Ronpibon, Nakhon Si Thammarat): Snout broad, depressed; rostral about a third wider than high, very slightly visible above; internasals less than half area of prefrontals, the suture between them half that between prefrontals; latter scales about as wide as long, bordering eye; frontal wider than long, its length equal to or slightly shorter than prefrontals, more than twice width of a supraocular; parietals elongate, their length only a little less than their distance from rostral; nasal divided, anterior part quadrangular, the posterior part larger, subtriangular; nostril large; loreal nearly twice as long as high bordering eye, touching three supralabials, but separated widely from internasal; no preocular, two postoculars; temporal formula: $1 + 2 + 3$; eight supralabials, fourth and fifth (on left side, third, fourth, and fifth) bordering eye; eye with a vertically oval pupil; infralabials nine, four bordering the anterior pair of chinshields which are much larger than second pair.

Scale-formula: 20 (occiput), 17, 17, 15, the median ten rows with weak keels. Ventrals, 216, laterally angulate with a slight notch on each side; anal, divided; subcaudals, 83.

Color in life: Dark purplish-black anteriorly, growing somewhat lighter posteriorly; a cream-ivory spot on sides of occiput back of jaw-angle; at level of 23rd ventral an ivory-white band, widest on venter, dorsal portion bearing many blackish scales; second light band begins on a level with fifty-first ventral, represented only by a few scattered ivory spots: third light band is barely indicated by some light flecks on venter with a small lateral spot on one side. Chin and throat grayish white; most ventrals grayish, color more intense on anterior part of each scale; subcaudal region darker gray than venter.

Measurements in mm.: Total length, 923; tail, 173; width of head, 14.3; length of head, 23.

Variation: The typical color pattern of the young consists of 10 to 13 light crossbands surrounding the body, the scales sometimes edged with black; the hinder part of the head white. In specimens from the northern part of the range the white bands are speckled with black and the underside of the tail may be white. The ventrals vary between 197-230,* the subcaudals 71-90; the anal scale is occasionally single. Rarely three postoculars are present.

Distribution: The species while known from a few localities in Thailand presumably ranges over the whole country. Outside of Thailand it is known from Southern China, Laos, Viet Nam, Cambodia, the Malay Peninsula, and the Indo-Australian Archipelago to the Philippines.

Remarks: I captured the described specimen within the hollowed base of a forest tree, ensconsed behind a loose fragment of wood at Ronpibon, Nakhon Si Thammarat. It moved with considerable rapidity. A second specimen was taken at Na Pradoo, Pattani.

Lycodon laoensis Günther

(Figs. 29, 30, 31)

Lycodon laoensis Günther, Reptiles of British India, 1864, pp. 317-318, (type-locality, Laos, French Indo-China); Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 354, pl. 24, fig. 2; Laidlaw, Proc. Zool. Soc. London, vol. 2, 1901, p. 576; Boulenger, A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore, Reptilia and

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* De Rooij states 128-230 and 61-90 for subcaudals. I suspect 128 is a typographical error.

Batrachia, 1912, p. 132; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 160; Bull. Raffles Mus., no. 3, 1930, p. 46; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 259-260.

Diagnosis: A small snake (475 mm.); body bluish, or brownish black, with narrow bright yellow or white cross-bars which expand laterally, the expansions enclosing triangular or other spots of same

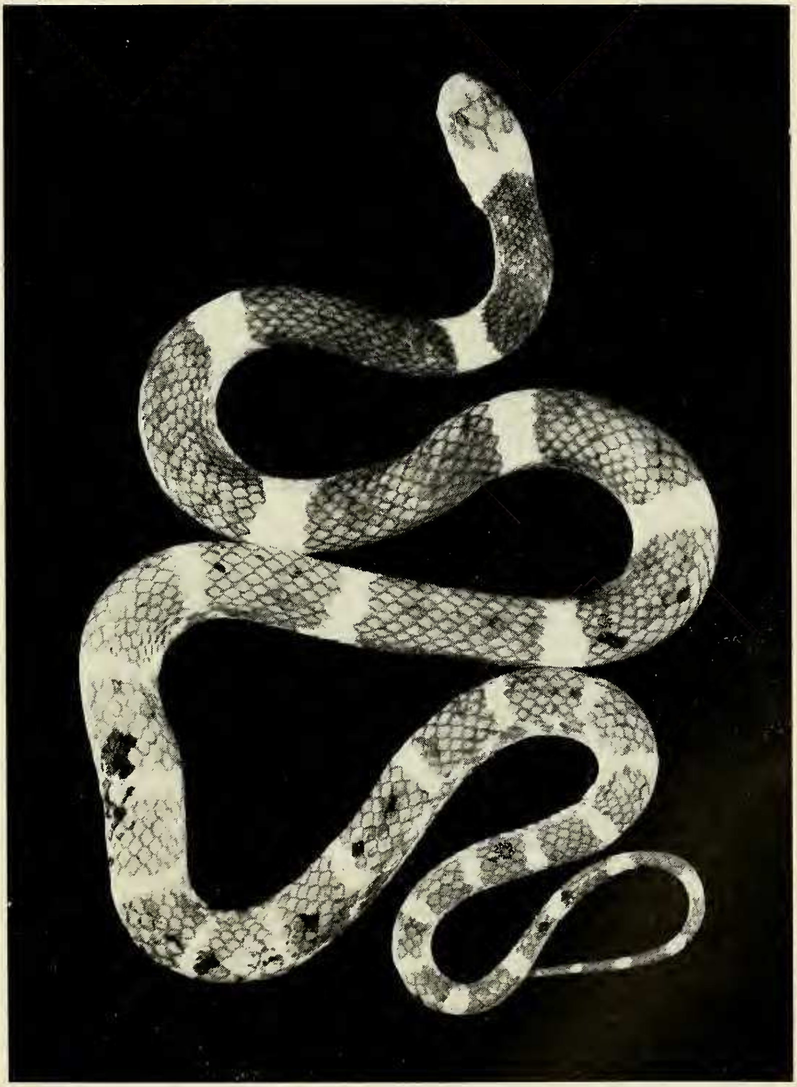

FIG. 29. *Lycodon laoensis* Günther. No. 33308♂, one and one-half miles west of Muak Lek, Sara Buri, but actually in the province of Nakhon Ratchasima, Thailand. Actual total length, 445 mm.; tail, 103 mm.

body color; a preocular separating prefrontal from eye, in contact with frontal; loreal elongate, not entering orbit, slightly in contact or not with internasal; anterior and posterior parts of nasal equal or anterior largest. Maxillary teeth in two groups separated by a diastema. A single apical pit on each scale.

Description of species (from No. 33308 ♂ one-and-one-half miles west of Muak Lek, Sara Buri, but actually in Nakhon Ratchasima province): Head moderately distinct from neck, rather flattened, the temporal regions not elevated; rostral much broader than high, part visible above less than half length of prefrontals; internasals less than half area of prefrontals, about as wide as long, their mutual suture about half as long as that between prefrontals; latter scales longer than wide; frontal short, four-fifths as wide as long, shorter than its distance from tip of snout, and much shorter (one third or more) than parietal; supraocular not more than half width of frontal. Nasal divided, anterior part a little larger than posterior; an elongate loreal narrowly touching internasal, but separated from eye by preocular and third labial; preocular large, in contact with the frontal; two postoculars; temporals, $\frac{1}{2} + 4 + 3$; ten supralabials, third, fourth, and fifth entering orbit; ten infralabials, five touching first chinshields which are about three times size of second pair; first pair of infralabials relatively large.

Scale-formula: 24 (occiput), 17, 17, 15; scales-smooth, with a single minute apical pit. Ventrals, 166; subcaudals, 71; anal, divided; ventrals more or less distinctly angulate.

Maxillary teeth: Anterior group of 5, first three small, then two much enlarged; after a curving diastema, eight small teeth, followed by two enlarged teeth that are smaller than the anterior enlarged ones.

Color in life: Above grayish blue, scales a little darker on edges. Top of head ultramarine, the color terminating in a point at terminus of suture between parietals; anterior supralabials same color; posterior labials cream, upper edges of labials bordering orbit, pigmented; a broad yellow band across occiput narrowed mesially. Chin and entire ventral surface yellowish ivory; subcaudal region, gray-white. A series of bright yellow transverse bars cross back, widening laterally and enclosing somewhat triangular spots of dark color; these are as wide as three transverse scalerows anteriorly but narrow posteriorly to width of one row (these without lateral spots). The spacing of dark blotches is different; the nuchal dark blotch

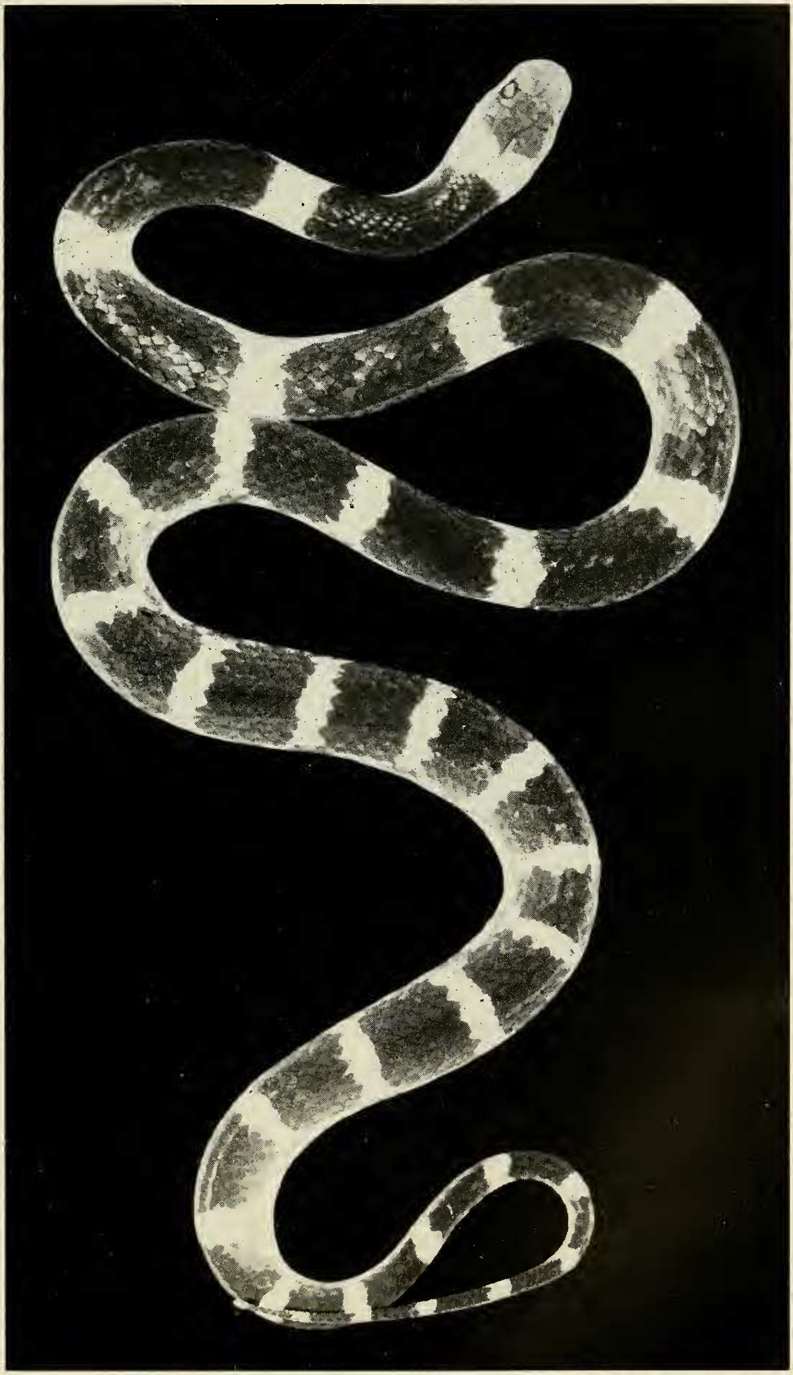

FIG. 30. *Lycodon laoensis* Günther. No. 33630 ♀, Chiang Mai, Chiang Mai, Thailand. Actual total length, 404 mm.; tail, 77 mm.

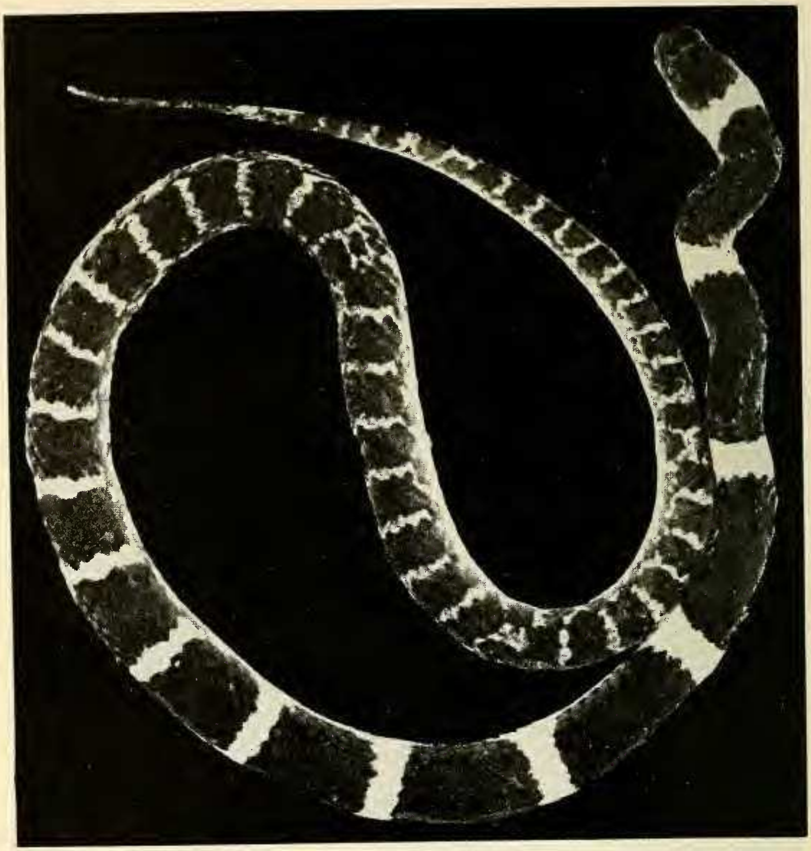

FIG. 31. *Lycodon laoensis* var. No. 34529♂, Pattani, Pattani province. Actual total length, 335 mm.; tail, 69 mm.

covers 17 transverse scalerows, and the eight succeeding ones cover 14, 14, 11, 9, 10, 9, 8, 6, transverse scalerows while the following ten body blotches cover either five or six; 14 blotches on tail; nowhere do spots or blotches reach ventrals; outer edges of subcaudals may have some pigment.

Variation: The known variation in ventrals is from 163 to 187; of subcaudals, 60 to 76. In Thailand specimens the ventral scales of the males vary from 165 to 187; the subcaudals, 60-73; females vary from 163 to 181, and 62 to 76.

The Chiang Mai specimens have a slightly narrower occipital light band, and there appears to be a stronger constriction of the head on a level with the eyes; one specimen differs in having the prefrontal and frontal fused at a narrow isthmus.

Measurements and scale data on *Lycodon laoensis*

NUMBER	33308	33630	33631	33629	33632	34529	36130	36549	249
Sex	♂	♀	♀	♀	♂	♂	♂	♂	♂
Total length	445	404	412	437	383	335	376	383	498
Tail	103	77	79	75	78	69	80	90	107
Head, width	9	8	8	8.5	8	7	7.8	8.1	10
Head, length	14	14	14	13.8	14	12.4	14.3	14.2	16
Ventrals	166	169	178	181	172	163	165	164.5	175
Subcaudals	71	64	65	62	65	65	64	76	71
Anal	2	2	2	2	2	2	2	2	2
Scale-formula	17–15	17–15	17–15	17–15	17–15	17–15	17–15	17–15	17–15
Preocular	1	1	1	1	1	1	1	1	1
Postocular	2	2	2	2	2	2	2	2	3–2
Supralabials	10–10	9–9	9–9	9–9	9–9	9–9	9–9	9–10	9–9
Infralabials	10–10	9–10	10–10	10–10	10–10	10–10	9–9	10–10	10–11
Anterior nasal largest	yes	=	yes	yes	yes	=	yes	=	yes
Black blotches body	19	21	26	23	20	36	25	23	25
Black blotches tail	14	11	12	15	12	22	15	15	21*

* An approximation. The separating light bars are darkened in the posterior part of body and on tail, so that an accurate count cannot always be made.

A specimen (No. 249) from Na Bon, Nakhon Si Thammarat was found precariously clinging to the almost-smooth surface of the trunk of a rubber tree about ten feet from the ground. Another was found under a small pile of dry grass. No. 249 contains a portion of a small *Mabuya multifasciata.* No. 36130, a male from Chiang Mai, contains a partly digested specimen of a *Leiolopisma.* Two Chiang Mai specimens (Nos. 33629, 33630) contain eggs, one four, the other three. No. 249 has an unusual parasitic worm embedded below the skin on one side. The parasite is approximately 20 millimeters in length and from 1.5 to 2 millimeters in diameter.

In the described specimen the loreal makes strong contact with the internasal while in most specimens it barely touches or does not touch the scale. There are fewer blotches on the body than in the other specimens.

A specimen from the extreme southern border of the range, was taken in the city of Pattani in the province of the same name (No. 34529). It differs in having 36 dorsal bands with 22 on the tail. In this, the loreal is well separated from the internasal on one side (other side injured); the preocular is separated from the frontal on one side, touching only at a point on the other; the anterior temporals are superimposed and are of approximately the same size. The temporal formula is: 2 + 3 + 4 + 4. A second southern specimen No. 3862 has been taken at Trang (Forest station).

Distribution: Found throughout Thailand. Outside of Thailand it is known from Malaya, Laos, Cochin China and Southern Viet Nam.

Remarks: The specimen described was dislodged from under loose bark on a tree at an elevation of nearly 30 feet above the ground.

Lycodon laoensis has developed certain variations which appear to be worthy of mention and sufficient southern material may permit subspecific designation for a southern form (figure given).

The typical form was described by Günther (1869) from Laos Mountains—two specimens "a male and a female, are perfectly alike." There are 185 ventrals and 68 subcaudals in the male. "Abdomen and tail with a distinct angular ridge on each side in the male, indistinct in the female"; "preocular single, in contact with vertical [frontal] and with the third labial"; "two postoculars"; "a third specimen has been purchased and is said to be from Siam"; Boulenger (1893) adds the following details, "temporals 2 + 3".

Table contrasting body blotches and ventrals of *Lycodon laoensis*

	Body blotches	Tail blotches	Sex	Total blotches	Ventrals	Sub-caudals	Totals	Numbers	Localities
Types	?	....	♂	?	179	68	247	B.M.a.	Laos Mts.
	?	....	♀	?	185	68	253	B.M.b.	Laos Mts.
	?	....	♀	?	183	73	256	B.M.c.	"Siam"
	19	14	♂	33	166	71	237	33808	Muak Lek
	20	12	♂	32	172	65	237	33632	Chiang Mai
	21	11	♀	32	169	64	233	33630	Chiang Mai
	23	15	♀	38	181	62	243	33629	Chiang Mai
	23	15	♂	38	164½	76	240½	36549	Doi Pna Tao*
	25	15	♂	40	165	64	229	36130	Chiang Mai
	26	12	♀	38	178	65	243	33631	Chiang Mai
	25	21	♂	46	175	71	246	249	Na Bon
	36	22	♂	58	163	65	228	34529	Pattani
	27	23	♂	50	171½	71	242½	3862	Trang
	?	?	?	42	176	69	245	?	Kedah

* Near Mt. Intanon.

Ventrals and subcaudals for the Siamese specimen are 183 and 73.

The specimens in the preceding table have been arranged in a north-south series to contrast number of spots and ventral scales:

One must regard the northern specimens as typical. In northern mainland Thailand the number of bands is from 19 to 26 on body; 11 to 15 on tail. In the southern (peninsular) part of Thailand, two specimens have 25 and 36 on body; 21 and 23 on tail. Total number of bands in northern Thai forms, 33 to 40; southern Thai forms, 46 to 58.

Mr. Boo-Liat of Kuala Lumpur has reported (Malayan Nature Journal vol. 12, 1958, pp. 183-184, pl. 12) two specimens from Kedah one of the northernmost Malayan states. His figure does not show as numerous caudal spots as occurs in the southern Thai specimens.

Lycodon capucinus Boie

(Fig. 32)

Lycodon capucinus Boie, Isis, 1827, p. 551, based on Russell's Indian Serpents, vol. 2, pl. 39, (type-locality, Trivandrum India); Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1136 (Rat Buri province, Thailand).

Lycodon aulicus capucinus Smith, The fauna of British India, Ceylon, Burma, including the whole of the Indo-Chinese Subregion; Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 265-266; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 131-132 (*part.*).

[Many references to *Lycodon aulicus* belong here but it is not always possible to determine which of the two forms is indicated.]

Lycodon aulicus Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, p. 16-17 (Lop Buri, Chiang Mai, Chon Buri).

The two forms presumed subspecies of *aulicus* occur together throughout much of their ranges. It seems necessary to regard them as species.

Diagnosis: Purplish to purplish brown with a reticulum of white or fawn, color confined to edges of scales and interstitial skin; snout and head rather flattened; a white band across occiput and nape, sometimes partly or completely divided mesially, the scales with lavender or purple spots; labials white with black dots; ventrals kneeled, ends turned up on ventrolateral area; loreal large, forming a suture with internasal; nine supralabials, three bordering orbit.

Description of species: (From No. 34948. Phu Kading, Loei province, Thailand): Snout flattened, projecting beyond mouth, somewhat excavated below, with a transverse blunt edge anteriorly; rostral higher than wide, bent back over tip of snout, well visible

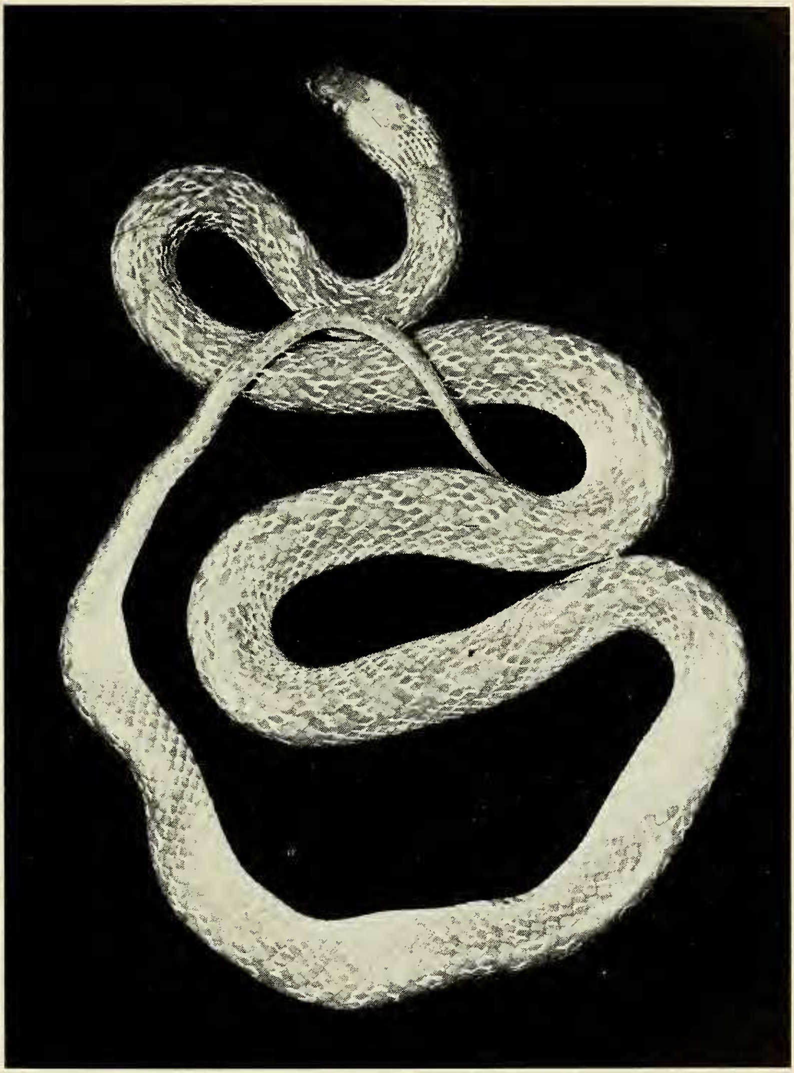

FIG. 32. *Lycodon capucinus* Boie. From Thailand. Total length, 528 mm.; tail, 93 mm.

above; internasals much smaller than prefrontals, slightly angular in front, forming a suture with loreal; prefrontals distinctly longer than wide, separated from supraocular by a minute distance; frontal slightly shorter than its distance from tip of snout, distinctly shorter than parietals; anterior nasal larger than posterior; loreal more than twice as long as high; large preocular touching frontal; two postoculars, each in contact with a temporal; two anterior temporals, the formula on right side $\frac{1}{1} + 2 + 3$, on left, $\frac{1}{1} + 2 + 4$; four temporals border parietals, the last separated behind parietals from its fellow by three scales; nine supralabials, third, fourth, and fifth enter eye (the third only narrowly); ten infralabials, first five touching first pair of chinshields, which are much larger than second pair.

Scales smooth, some with a minute apical pit (that can scarcely be discerned except in a transparent shed scale). Scale-formula 17-17-15. Ventrals, 205; subcaudals, 71; anals, 2; lateral keels on ventrals moderately distinct.

Color in life: Head dark purplish back to level of parietals; parietals light brownish lavender; occipital light band not divided mesially, each scale with a purplish spot; this followed by a brown band; labials all yellowish with a large purplish brown spot; body lilac to lavender-brown with a reticulum of whitish or fawn (this chiefly on scale edges and interstitial skin); tail nearly uniform brown; dirty white on venter.

Measurements and data on Lycodon capucinus

NUMBER	34948 ♀	35954	33633	No No. ♂
Total length	521	436	385	528
Tail	113	73	47	93
Head, width	10.2	9	9	10
Head, length	18	14.6	16	15.9
Ventrals	205	195	188	203
Subcaudals	71	61	67	65
Preoculars	1	1	1	1
Postoculars	2	2	2	2
Supralabials	9–9	9–9	9–9	9–9
Infralabials	10–10	10–10	10–10	10–10
Anterior nasal largest	yes	yes	yes	yes
Labials enter eye	3, 4, 5	3, 4, 5 (4, 5)	3, 4, 5	3, 4, 5

No. 34948 from Loei; 35954, 33633, Chiang Mai.

Variation: The specimens available agree in most characters. However one specimen has 19 rows of scales about neck, seventeen being the normal number. Ventrals vary in Thai specimens from 188 to 205, the subcaudals from 61-71, the higher numbers of ventrals and subcaudals being found on females.

Distribution: The species is known in Thailand from Chon Buri, Lop Buri, Rat Buri and Chiang Mai. Outside of Thailand the species is known from India throughout southeastern Asia, Malay Peninsula, the Indo-Australian Archipelago to the Philippines and Celebes.

Remarks: The species is very domestic, being found in human habitations, especially those built with bamboo and palm leaves. It is presumed that the domestic geckoes attract these snakes since lizards form the major food of the species.

Lycodon fasciatus (Anderson)

(Fig. 33)

Ophites fasciatus Anderson, anatomical and zoological researches and zoological results of the Yunnan Expeditions. Reptilia collected on the two expeditions to western Yunnan, 1879, p. 827, pl. 78, fig. 1; (type-locality Ponsee [Pangsi] Yunnan); Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 614.

Lycodon fasciatus: Boulenger, The Fauna of British India including Ceylon and Burma, 1890, pp. 295-296; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 358; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 372; Evans, *ibid.*, vol. 30, 1925, p. 812; *ibid.*, vol. 31, 1926, p. 562; Schmidt, Bull. Amer. Mus. Nat. Hist., vol. 54, 1927, p. 523; Pope, Reptiles of China, 1935, pp. 188-191; Bourret, Le serpents de l'Indochine, 1936, p. 155; M. Smith, The fauna of British India including Ceylon and Burma, Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 266-267.

Diagnosis: A snake reaching nearly a meter in length. Black bands, wider anteriorly, separated by narrow yellowish bands that are sparsely pigmented with brown or black. Head black-brown above, lighter on temporal and occipital regions (white in young). An elongate loreal entering orbit with a small preocular above it, separating prefrontal from eye; scalerows, 17-17-15, the median five to seven or more rows keeled; ventrals feebly angulate.

Description of species: (Specimen from Doi Suthep, Chiang Mai, Thailand): Head somewhat flattened, snout projecting a little beyond mouth; temporal region somewhat swollen; rostral distinctly broader than high, portion visible above very narrow; internasals about a third of area of prefrontals, about as wide as long; prefrontals large, their common suture nearly double that between internasals; frontal a little shorter than its distance from tip of snout, very much shorter than parietals, four-fifths as wide as long; nostril between two nasals posterior much the larger with a depression behind nostril; loreal elongate more than two-and-one-half times as long as high, entering eye; a preocular separating prefrontal from eye; supraocular widened posteriorly, about half width of frontal; temporals, 2 + 2 + 2 the upper anterior touching two postoculars; supralabials eight, third, fourth, and fifth entering orbit; nine infralabials, five touching first pair of chinshields which

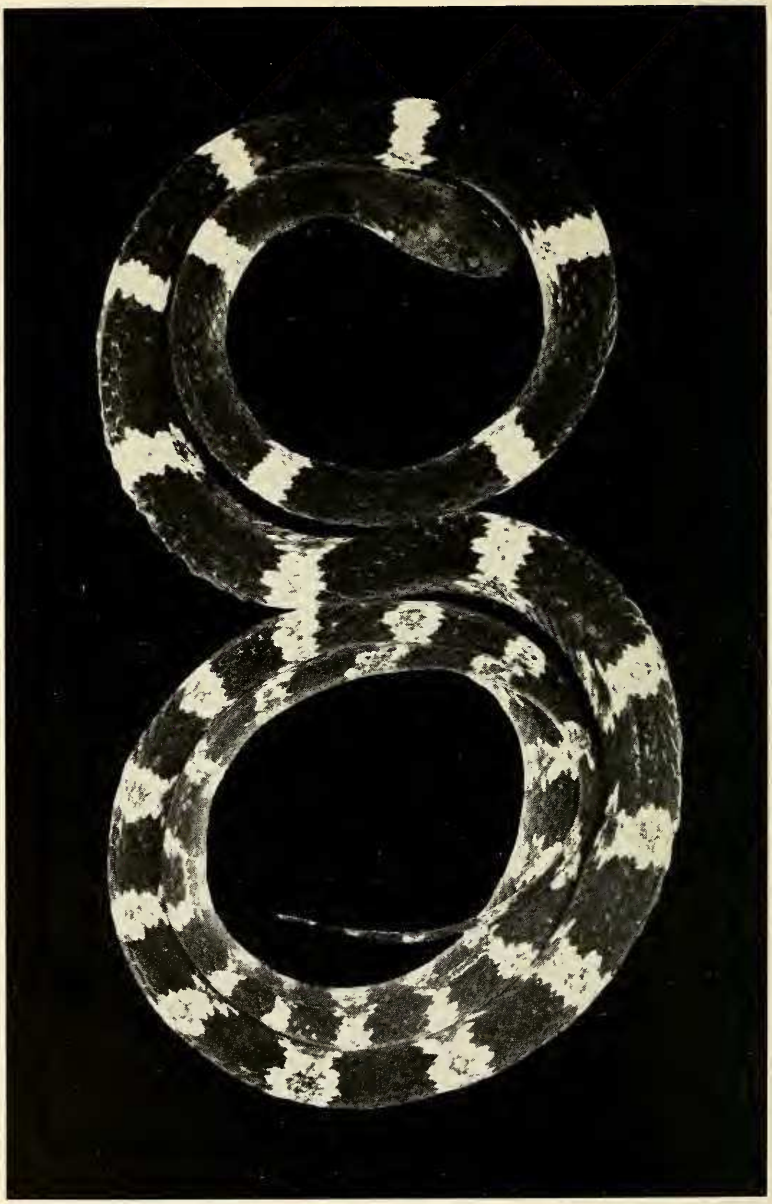

FIG. 33. *Lycodon fasciatus* (Anderson). Specimen from Doi Suthep, Chiang Mai, Thailand. Actual total length, 830 mm.; tail, 169 mm.

are a little larger than third pair; second pair very small. Scale-formula: 23 (occiput), 17, 17, 15, with small apical pits; anteriorly five median scalerows lightly keeled, while on posterior half of body seven to nine rows more distinctly keeled; opposite vent there are 13 rows strongly keeled. Ventrals, 209; subcaudals, 85; anal, single.

Color in life: Banded purplish black and cream yellow, the yellow bands two to three scale lengths in width, the edges very irregular on venter, widening so as to cover from three to five ventrals on anterior half of body, one or two on posterior part of body; scales in the yellow-cream bands pigmented more or less, often forming small spots or indefinite blotches, more strongly indicated on latter two thirds of body and tail; black bands vary in width, the nuchal band covering 18 transverse rows, and the succeeding eleven ones cover 13, 11, 10, 8, 7, 6, 6, 7, 7, 6, 5 respectively on the mid-line; the following 16 body bands cover between 3 and 5 transverse rows. The 13 bands on tail usually cover between three and five. Head brownish, anterior part darker than posterior; supralabials each with a dirty cream center; chin with brownish pigment, posterior infralabials cream; first seven ventrals cream.

Measurements in mm.: Total length, 830; tail, 169; snout to vent, 661; width of head, 13; length of head, 19.

Variation: The head is distinctly wider than the neck. The ventral scales are angulate laterally (but not strongly so) and the body is somewhat compressed. The tail tapers to a fine point.

A younger specimen examined has thirty dark bands on body, eighteen on the tail. On the head a dark brown mark covers the snout and the interorbital area, terminating on the anterior fourth of the parietals. The occipital and temporal regions are light brown, bordered behind by a narrow white line. A few of the bands on the anterior part of body are broken on the venter.

The squamation is as follows: supralabials, 8; infralabials, 9; there are 3-2 postoculars, the temporals, 2 + 2 + 3, 2 + 3 + 3. There are *three pairs of chinshields,* the first pair bordered by four infralabials, the *second, smallest* pair bordered by two, the *third pair* touching only one infralabial. There are 206 ventrals, 80 subcaudals, and the anal is single.

In the described specimen the left anterior chinshield is divided, but the middle chinshield on the right side is fused to the posterior. The color of the light bands is gray-white, the ventral coloration being somewhat cream.

The known variation in the ventrals is from 197 to 220; in the subcaudals, 69 to 94. The number of body bands varies between 28 and 49. In the very young, the back of the head is white.

Distribution: In Thailand the species has been reported from Tawkawbee, 9 mi. S. of Um Pang (lat. 16 N. long. 98° 75′ E.). Both specimens here reported are from Doi Suthep, Chiang Mai. The species extends from the eastern Himalayas, to Tibet, Burma, upper Laos, West China, and Viet Nam.

Remarks: The species is a bush snake, usually found at elevations of from 1000 to 2300 meters. The largest specimen known to me reaches a length of 934 mm.

Genus *Dinodon* Duméril and Bibron

Dinodon Duméril and Bibron, Mem. Acad. Sci. Paris, vol. 23, 1853, p. 463; Erpétologie générale . . . vol. 7, 1854, p. 447, (type of genus, *cancellatum* = *rufozonatum*).

Eumesodon Cope, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 262, (type of genus, *semicarinatus*).

Lepidocephalus Hallowell, Proc. Acad. Nat. Sci. Philadelphia, vol. 12, 1860, p. 498, (not of Bleeker), (type of genus, *semicarinatus*).

Adiastema Werner, Sitz. Ber. Akad. Wiss. Wien, vol. 134, p. 54, (type of genus, *cervinum*).

Lycodon Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 291 (*part.*).

Diagnosis: Head rather broad, somewhat flattened, scarcely distinct from neck; eye with a vertical pupil; scale-formula: 17, 17(19), 15; scales smooth or with indistinct keels; ventrals with or without lateral keels; scales with apical pits.

Maxillary bones extending farther forward than palatine, bent inward, with five to seven anterior teeth increasing in size posteriorly, sometimes separated from posterior teeth by a diastema; posterior teeth of first group fanglike, of second group posteriormost only slightly larger than others.

Of the nine recognized species only a single one is known to reach Thailand. It enters from the north and has been traced as far south as Chiang Mai.

It is difficult to differentiate between *Lycodon* and *Dinodon* since the differences are small. The shape of the maxillary bone and the dental characters are perhaps the most important.

The wisdom of retaining *Dinodon* as a separate genus has been questioned.

Dinodon septentrionalis septentrionalis (Günther)

Ophites septentrionalis Günther, Proc. Zool. Soc. London, 1875, p. 233 (type-locality "there is no doubt that he [Dr. Jerdon] obtained it during his last journey through the northern parts of India").

Lycodon septentrionalis Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 295 (states the length of type 83 inches (evidently a misprint) should be 33 inches).

Dinodon septentrionalis Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 363, (*part.*), and vol. 3, addenda, 1896, p. 619 (Cobapo, Karin Hills); Ann. Mus. Civ. Genova, ser. 2, vol. 13, 1893, p. 324; Journ. Bombay Nat. Hist. Soc., vol. 16, 1905, p. 235; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 778; *ibid.*, vol. 29, 1923, p. 615; Rec. Ind. Mus., 1909, p. 146; Angel, Bull. Mus. Nat. Hist. Paris, 1929, p. 79; Bourret, Serpents de l'Indo-Chine, 1936, p. 162; M. Smith, The fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese Subregion; Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 270-271, fig. 91.

Diagnosis: Black with 25 to 35 narrow white or yellowish bars, becoming wider on sides; venter whitish; tail black below; 207-212 ventrals with lateral keels; 81-92 caudals; anal, single.

Description of species (composite sources): Rostral narrowly visible above, slightly angulate on median line; internasals somewhat narrowed in front; prefrontals about two and a half times size of internasals; suture between prefrontals and frontals nearly a straight line; frontal as broad as long; supraoculars slightly more than half width of frontal; parietals elongate, but length less than distance between posterior part of frontal and tip of snout. Nasal divided, posterior portion higher and larger than anterior; loreal small, narrow, separated from internasal and eye; two small postoculars; two anterior temporals followed by two posterior; lower anterior and upper posterior temporal much the largest. Eight supralabials, third, fourth, and fifth bordering orbit; seven or eight infralabials.

Scales smooth, the formula: 17, 17, 15. (One presumed subspecies may have from five to seven median rows keeled.)

Color: Purplish black above and on sides, with 25-35 narrow white transverse bars on body which may expand laterally; on forepart of body bars about twice as far apart from one another as on hinder part; venter white, sometimes spotted or barred with black, these markings being a continuation of the dark color on back; tail heavily marked with black below; posterior part of head white in young, usually black in adults.

Measurements in mm.: Total length, 1,180; tail, 190.

Distribution: The species has been found only in the northern part of Thailand in the province of Chiang Mai.

Outside of Thailand it occupies territory in the Eastern Himalayas, Assam, Burma, and Laos.

Remarks: The type of *Dinodon septentrionalis* (Günther) is said to be a snake, 83 in. (1,962 mm.) in length according to Günther.*

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* Boulenger, l. c. 1893, believes this is intended for 33 inches.

There are 214 ventrals and 83 subcaudals. It is black in color, the trunk with thirty narrow white rings only two scales wide, the first at some distance behind the head. It is white on venter, the subcaudals marbled with black. Ventrals ♀ 214; subcaudals, 83.

Genus *Oligodon* (Boie *in* Boie)

Oligodon Boie *in* Boie, Isis, 1827, p. 519 (type of genus *Oligodon bitorquatus*).

Simotes (not of Fischer 1817) Duméril, Bibron and Duméril, Erpétologie général . . . vol. 7, 1854, p. 624 (type of genus, *russelli*).

Holarchus Cope, Proc. Amer. Phil. Soc., vol. 23, 1886, p. 488 (type of genus not designated).

Dicraulax, Cope, Amer. Nat., 1893, vol. 27, p. 480 (type of genus *Holarchus trinotatus* = *Simotes purpurascens*.

Malcolm Smith writes (1943, The fauna of British India, pp. 196-197): "Wall quite rightly (1923) has united *Holarchus* with *Oligodon*, the latter being only a degenerate group of the former. The passage from one to the other is gradual and no dividing line can be drawn. Degeneration has led to reduction in the number, but not always in the size, of the maxillary teeth; reduction in the number and size of the palatine teeth, but in no species are they entirely lost."

Diagnosis: Rather short medium-sized snakes rarely reaching a meter in length, while many of the species are less than half a meter. Maxillary teeth 6-16; scalerows, 13-23.

KEY TO THAI SPECIES AND SUBSPECIES OF *Oligodon*

1. Scales with paired apical pits 2
   Scales without apical pits 3
2. Scales in 17 rows at mid-body; spots on venter present or absent (two subspecies) .... *cinereus*
   Scales in 15 rows at mid-body; spots absent on venter .... *inornatus*
3. Scales in 21 rows at mid-body 4
   Scales in 19 rows or less at mid-body 6
4. Body with two median darker longitudinal stripes separated by a lighter median dorsal stripe; a lateral stripe to vent level; ten more or less divided dorsal dark blotches; tail long, one fifth to one sixth of total length; venter immaculate; ventral-subcaudal count high (to 229½) .... *dorsolateralis*
   Body without median or lateral darker longitudinal stripes; markings transverse 5
5. Series of 13-18 transverse dark spots on back and tail or spots with white or light centers, separated by ground color and three narrow irregular dark transverse lines, the dark color confined to edges of scales; venter without black quadrangular marks .... *cyclurus smithi*
   No distinct spots but numerous transverse irregular lines across dorsum, the dark color confined to edges of scales .... *cyclurus superfluens*
6. Scales in 19 rows 7
   Scales in 17 to 15 rows; more or less than half a meter in length 8

7. Small slender snakes with four dark longitudinal lines on body, the two median separated by a lighter line; a narrow lateral line; no spots on dorsal or caudal area...*quadrilineatus*

Larger snakes reaching about 90 cm. in length without longitudinal dorsal stripes but with transverse dark spots and narrow dark lines (rarely 21 scalerows)...*p. purpurascens*

8. More than half a meter in length (to 760 mm.); scalerows 17 or 15 near mid-body; no longitudinal lines. Maxillary teeth twelve, steadily increasing in size posteriorly. Purplish-brown above with ill-defined and broken cross-bands, every alternate one enlarged. Belly red or red barred with black (in life); head markings like *cyclurus*; hemipenis like *cinereus*. *joynsoni*

Less than half a meter in length; scales in 17 rows; longitudinal lines on body.. 9

9. Maxillary teeth 14-16; ventrals, 146-169; subcaudals, 30-47. Four dark brown or blackish longitudinal lines, two median (wide) separated by a somewhat irregular narrow light stripe (width of one scalerow); series of quadrangular spots on ends of ventrals; ventrals coral-red in life, whitish in preservative. A black spot at base of tail and one at tip (rarely absent)...*taeniatus*

Maxillary teeth 13-14; ventrals 135-160, subcaudals 32-44; 14 or 15 transverse, rather narrow dark dorsal spots, light-edged on body and tail (often broken in two or four separate dots) separated by three more or less distinct transverse marks, the black confined to edges of scales; a dark-edged median light longitudinal line; venter with quadrangular spots...*barroni*

Oligodon cinereus (Günther)

Simotes cinereus Günther, The reptiles of British India, 1864, p. 215 (type-locality, "Gamboja" = Cambodia).

This species, extending from the Indo-Chinese region to India and southern China, seemingly has broken up into several subspecies. At least two forms occur in Thailand, one in the northern part of Chiang Mai province, and one in the southern part of that province and in Loei province. These are *Oligodon c. swinhonis* and *Oligodon c. multifasciatus*. They may be distinguished by the following key:

KEY TO THAI SUBSPECIES OF *cinereus*

1. A well-defined narrow chevron on neck, the posterior arms extending from three to four scale-lengths posteriorly; a narrow anterior process from chevron terminates on frontal (sometimes forming two small spots); diagonal black stripe above mouth angle; and a band across snout through eyes; venter yellowish white with paired series of quadrangular dark spots on outer sides of ventrals, those bearing spots separated by one or two lacking spots; 17 scalerows at middle; ventrals 190-197; subcaudals 32-42...*cinereus multifasciatus*

2. Dark chevron on neck dim the centers of scales involved light gray; band across snout almost or completely obsolete or a dim dark spot below eye; diagonal stripe above mouth-angle usually absent; entire chin and venter immaculate, the upturned edges of posterior ventrals with some pigment. Part of the transverse marks on body intensified somewhat, separated by three dim transverse marks, the middle one may be a little darker than other two...*cinereus swinhonis*

Oligodon cinereus swinhonis Günther

(Fig. 34)

Oligodon swinhonis Günther, The reptiles of British India, 1864, p. 215, pl. 20, fig. E (type-locality, Amoy, China).

Simotes violaceus: Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 2, 1894, pp. 222-223 (*part.*).

Oligodon cinereus: M. Smith, The fauna of British India, Ceylon and Burma, . . . Reptilia and Amphibia, vol. 3, Serpentes. Dec. 1943, pp. 215-217 (*part.*).

Diagnosis: See key.

Description of subspecies (from No. 3464 ♀, Chiang Mai province): Rostral higher than wide, the part visible above triangular, its length greater than its distance from frontal, the scale thickened, its edges elevated on sides; internasals triangular, much narrowed posteriorly, their common suture about half as long as that between prefrontals; latter scales twice as wide as long; frontal shield-shaped about one fifth longer than wide, longer than its distance from tip of snout, shorter than parietals, less than twice as wide as supraocular; parietals sharply truncate behind, somewhat emarginate laterally; nasal divided; loreal longer than high; a single preocular, and on left side, a subocular, none on the right side; two postoculars; temporals, 2 + 2 + 3 (2 + 3 + 3); supralabials seven, (the fourth and fifth presumably fused) and only a single scale bordering orbit; infralabials nine, four touching first chinshields which are double size of second pair.

Scale-formula: 23 (occiput), 17, 17, 15; scales smooth with distinct apical pits. Ventrals, 196; subcaudals, 42; anal, single. Tail definitely rounded above, flat below.

Color: Above generally brownish fawn to gray (dull salmon-pink in life); anteriorly outer scalerow nearly salmon-pink practically without pigment, but more posteriorly covered with gray pigment. A dark chevron on nape the posterior arms of which equal in length to three or four scales; and with a forward process reaching onto parietal suture. A faint dark mark below eye but no trace of the band through eye across snout; no diagonal marks above angle of mouth.

Edges of many scales on dorsum dark forming irregular transverse marks reaching on sides to outer scalerow. One series of about 21 transverse marks somewhat intensified, separated by three intervening bands, the median one darkest. Median scalerow on body vaguely lighter than others and on tail this line, with indefinite edges, is more distinct. Venter immaculate yellowish white

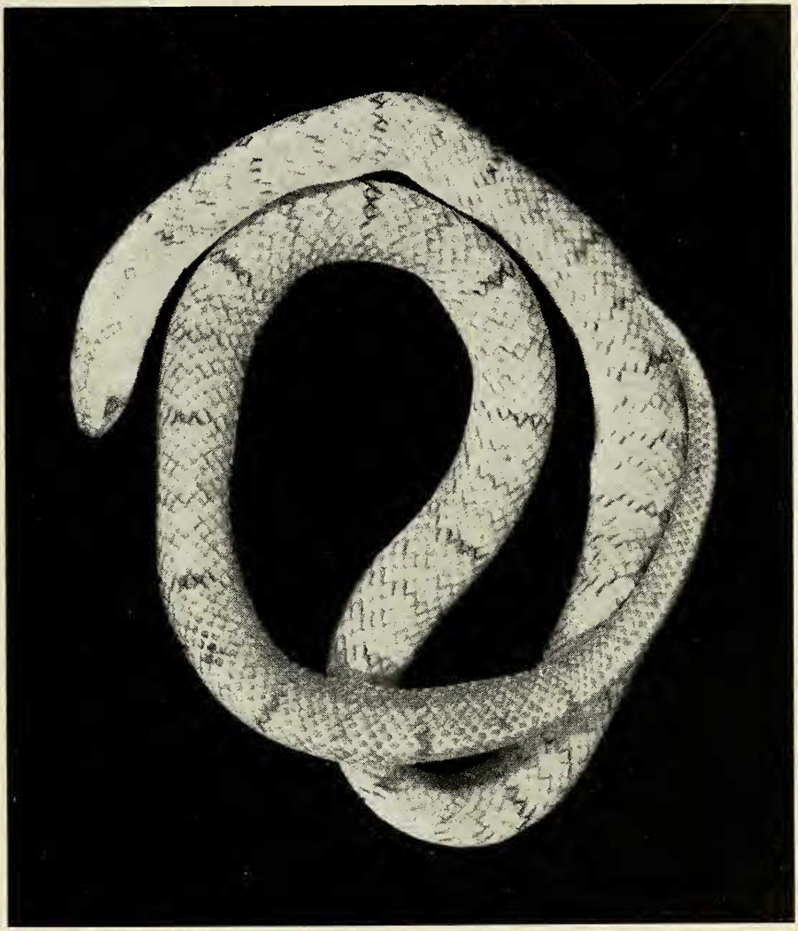

FIG. 34. *Oligodon cinereus swinhonis* Günther. No. 3464, 12 km. north of Chiang Dao, Chiang Mai province, northern Thailand. Actual total length, 632 mm.; tail, 84 mm.

to ivory lacking ventral spots of black; outermost edges of ventrals posteriorly have some pigment.

Measurements in mm.: Total length, 632; tail, 84; width of head, 14; length of head, 18.2.

Variation: The type, also a female, has 174 ventrals, and 34 subcaudals. The described specimen has considerably more than this number—196, and 42.

In Thailand this is, so far as I am aware, the only specimen that has been taken. It is presumed that it is a northern form, occuring in southern China (Amoy and westward).

Oligodon cinereus multifasciatus Jan

(Fig. 35)

Oligodon multifasciatus Jan *in* Jan and Sordelli Iconographie générale des ophidiens, vol. 1, livr. 12, pl. 5, fig. 2, (type-locality "Sultanepore").

Simotes violaceus: Boulenger, Catalogue of the snakes in the British Museum, vol. 2, pp. 222-223 (*part.*).

Oligodon cinereus: M. Smith, The fauna of British India, Ceylon and Burma . . . vol. 3, Serpentes, Dec. 1943, pp. 215-217 (*part.*).

Diagnosis: See key.

Description of subspecies (from EHT-HMS No. 3623, Chiang Mai province, Thailand): Part of rostral visible above forming a triangle, the scale thickened, slightly elevated when seen from sides; internasals much wider than long, somewhat pointed mesially; prefrontals with a median suture less than twice length of internasal suture; frontal shield-shaped, about as long as wide, shorter than its distance from tip of snout, shorter than parietals; posterior border of parietals forming a median angle. Nostril between two nasals, anterior one the larger; loreal longer than high touching two labials; a large upper preocular, and a small lower (subocular); two postoculars; temporals, $\frac{2}{1} + 2$, somewhat irregular; supralabials, 7-7 (due to apparent fusion of second and third on one side, and of fourth and fifth on other); infrabials, 8-8, four touching anterior chinshields which are more than twice as large as second pair.

Scale-formula: 21 (about occiput), 17, 17, 15 (just preceding vent). Ventrals 196; subcaudals (paired), 38; anal, single.

Color: Ground color brownish gray with black edges of many scales tending to form irregular broken transverse marks separated by one scalerow; edges of the intervening row usually cream or ivory, the color normally concealed and extending to interstitial skin. A narrow chevron on nape, its posterior arms equal in length to four or five scale-lengths; anterior median projection broken, with a round spot on parietals and one on frontal; a dim dark diagonal line above angle of mouth; a line beginning on labials passes through eye and across forehead anterior to frontal. Venter distinctly yellowish ivory with a double row of somewhat quadrangular black spots on ventrals, paired or alternating, usually separated by an unspotted ventral; chin unspotted; a few subcaudal spots; tail rounded above, flat below with an indistinct median lighter supracaudal line.

Measurements in mm.: Total length, 683; tail, 77; width of head, 13.2; length of head, 20.

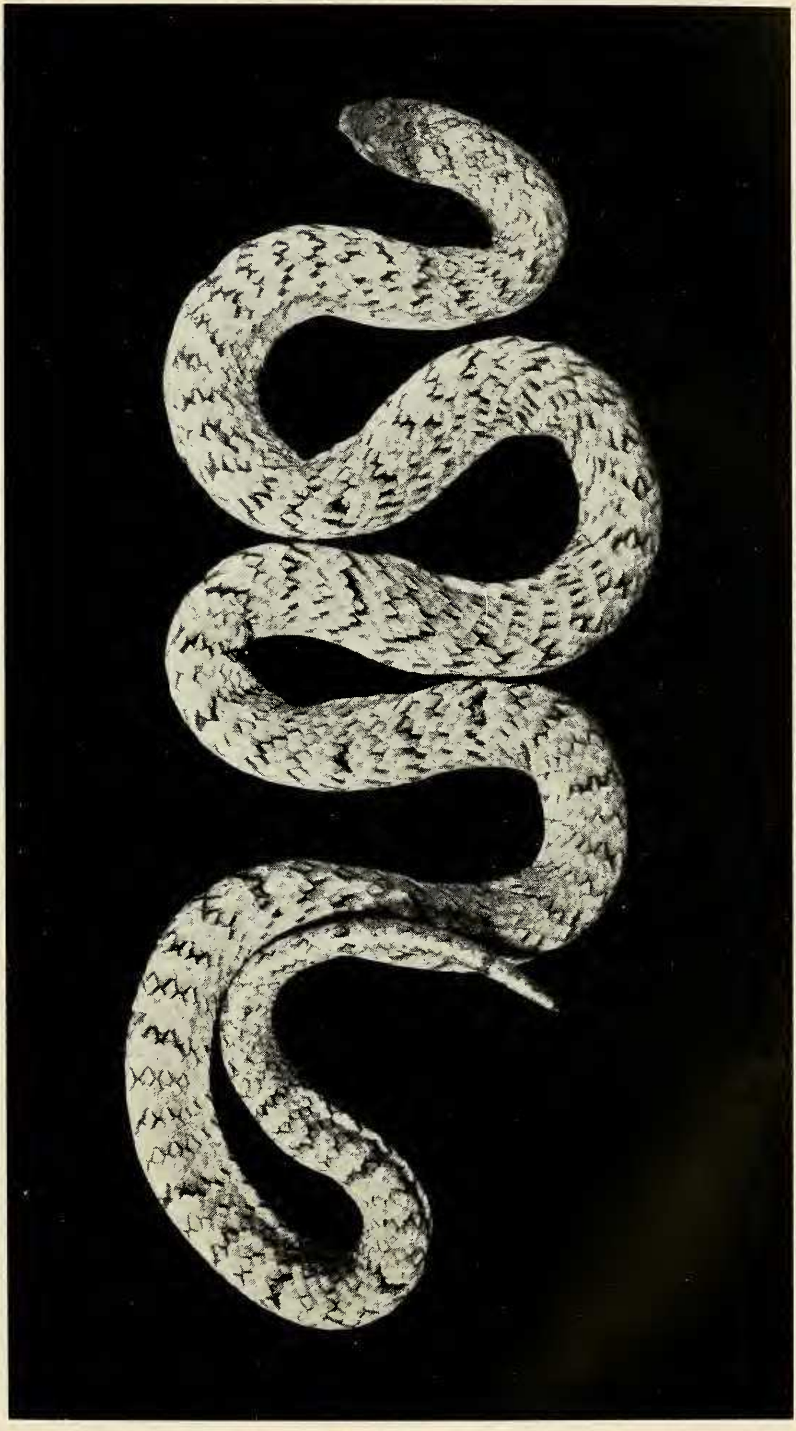

Fig. 35. *Oligodon cinereus multifasciatus* Jan. No. 3623, Chiang Dow (12 km. north), Chiang Mai province. Actual total length, 683 mm.; tail, 77 mm.

Variation: The following table shows variation in three Thai specimens:

Scale-data and measurements of *Oligodon cinereus multifasciatus*

NUMBER	Province	Ventrals	Subcaudals	Supralabials	Total length	Tail length
31699.......	Loei...........	190	32	8-7*	600	71
3623........	Chiang Mai....	196	38	7	683	77
28..........	Chiang Mai....	197	42	7	90	21

* The 2nd and 3rd scales are fused on one side; there are two scales bordering orbit; the tail of No. 31699 is immaculate below.

Remarks: The form is known in Thailand from southern Chiang Mai and Loei provinces.

The type-locality is "Sultanepore," a locality unknown to me.

Oligodon inornatus (Boulenger)

Simotes inornatus Boulenger, Journ. Nat. Hist. Soc. Siam, vol. 1, pt. 1, 1914, p. 68 (type-locality, Nong Kai Ploi, E. of Sriracha, southeastern Thailand); M. Smith, *ibid.*, pp. 68-69.

Oligodon cinereus M. Smith, The fauna of British India . . . vol. 3, Serpentes, 1943, pp. 215-217 (part.).

Diagnosis: Uniform pale brown above, yellowish white beneath scales in 15 rows about body.

Description of species (from Boulenger's type-description): Nasal divided; portion of rostral seen from above as long as its distance from frontal; suture between internasals longer than that between prefrontals; frontal equal to its distance from tip of snout, and as long as parietals; two postoculars, no suboculars; temporals, 1 + 2; eight supralabials, fourth and fifth bordering orbit; four infralabials bordering anterior chinshields which are nearly twice as long as posterior.

Scales in 15 rows; ventrals, 171; anal undivided; subcaudals, 42.

Color: Uniform pale brown above, yellowish white beneath.

Measurements in mm.: Total length, 580; tail, 90.

Remarks: Published with Boulenger's paper (*loc. cit.*) was a description of a specimen of *Oligodon* by Dr. Malcolm Smith, which he regarded as a second specimen of Boulenger's *inornatus.* Smith (1943) abandoned the species placing *inornatus* as a synonym of *Oligodon cinereus* (Günther).

However there is a very strong possibility that *inornatus* is worthy recognition; and the specimen referred to it originally by Smith may require a reassignment.

Smith's statements regarding this form follow: "This snake was collected and kindly forwarded to me by Mr. P. A. R. Barron of the Borneo company, to whom I am also indebted for a second specimen, which differs from the type description in the following particulars. Position of rostral seen from above, shorter than its distance from the frontal; suture between the internasals equal to suture between the prefrontals. Loreal as long as deep. Ventrals 174. Subcaudals 40. Color. Above, dull, salmon red (much brighter I am informed in life) and with very faintly marked dark greyish narrow cross-bars. Below, with indistinct, small squarish spots, placed laterally, in the posterior half of the body and tail. This specimen has been in my possession for some months, and the handsome red coloring has gradually faded until now it is nearly of the brown hue described by Mr. Boulenger. Mr. Barron who saw both specimens when fresh informs me, however, that the first one never showed any red coloration."

The type locality of *inornatus* is Nong Kai Ploi, East of Sriracha, Chon Buri. Boulenger regarded the species as being related to *violaceus*. M. Smith (1943) remarks that, "Specimens from the extreme south-eastern corner of Siam (south of Retriu) and eastwards to the adjacent territory of Cambodia, have only 15 scale rows at mid-body."

Oligodon dorsolateralis Wall

Simotes albocinctus dorsolateralis Wall, Journ. Bombay Nat. Hist. Soc., vol. 19, p. 898 (type-locality Jalpaiguri District, no type designated).

Oligodon cyclurus: M. Smith, The fauna of British India, Ceylon and Burma, . . . Reptilia and Amphibia, vol. 3, Serpentes. Dec. 1943, pp. 202-206 (*part.* var. IV.)

Diagnosis: Scales in 21 rows, with four longitudinal stripes, the two median extending to tail, the two lateral to level of vent; ten more or less divided dorsal blotches, four on tail. Tail long, between one fifth and one sixth of body length; venter immaculate, occasionally spotted (in Burmese specimens).

Description of species (from No. 77 ♂): Rostral about as high as wide, the triangular part visible above, distinctly shorter than its distance from frontal, thickened as seen from sides; internasals rather angular on anterior edge, much wider than long, somewhat obliquely placed, prefrontals nearly twice as wide as long, their common suture equal to that between internasals; frontal slightly longer than its distance from tip of snout, as long as parietals; latter nearly as broad as long; nasal divided, anterior part largest; loreal quadrangular, higher than long; two preoculars, or one preocular and one subocular, latter lying below level of eye between third and fourth labials; two postoculars, both touching first temporal; temporal formula, 1 + 2 + 3, somewhat irregular (one might regard the arrangement as two anterior temporals the lower largest and separated from both postoculars by the upper); eight supralabials, fourth and fifth bordering orbit; nine infralabials, four touching anterior chinshields which are somewhat more than twice size of second pair.

Scale-formula: 24 (occiput), 19, 21, 17; ventrals, 176½; anal, single; subcaudals, 53. Body somewhat angular ventrally; tail distinctly triangular in cross-section and somewhat stiffened, ending in a semirigid point.

Color in life: Above light brown with a pair of median stripes, each covering two scalerows and part of a third, posteriorly separated by a light median stripe covering all of one scalerow; posteriorly stripes extending to tip of tail, anteriorly joining a chevron-shaped mark that terminates at middle of frontal; two oblique temporal marks cross angle of mouth, passing slightly beyond; a wide dark mark on snout reaching from back part of frontal to rostral, laterally crossing eye to upper part of fifth labial; a lateral stripe on edges of fourth and fifth scalerows, reaching to level of vent; ten dorsal blotches mesially divided and more or less confluent with small lateral spots on lateral stripe; below on chin and venter immaculate ivory; ventrals upturned laterally, the upper edges with some grayish pigment similar to adjoining scalerows. Tail with four dorsal spots.

Measurements in mm.: Total length, 607; tail, 105; width of head, 13; length of head, 20.

Variation: The specimen described is from the city of Chiang Mai. I first saw the specimen from a hospital window in the yard and captured it.

The species originally described by Wall, was placed as a subspecies of *albocinctus;* Malcolm Smith regards it as a form of *cyclura.* As another subspecies of *cyclura* occurs here it seems best to regard this as a distinct species.

Distribution: This form is known only from this locality in Thailand. Elsewhere it occurs in Burma and Assam or near the Assam-Bengal boundary.

Oligodon cyclurus (Cantor)

Coronella cyclura Cantor, Proc. Zool. Soc. London, 1839, p. 50, (no type-locality known, the type lost. A colored drawing signed by Cantor exists.)

Simotes cyclurus: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 311; Catalogue of the snakes in the British Museum, vol. 2, 1894, pp. 219-220; Ann. Mus. Civ. Genova, ser. 2, vol. 13, 1893, pp. 324-325; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 97, fig.; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 780.

Holarchus purpurascens: Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, pp. 27-28 (Bangkok).

Holarchus cyclurus: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 14, 1920, p. 96.

Oligodon purpurascens: (*non* Schlegel) Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 631; *ibid.,* vol. 30, 1925, p. 815; *ibid.,* vol. 31, 1926, p. 563; Rec. Ind. Mus., vol. 35, 1923, p. 328; *ibid.,* vol. 25, 1923, p. 328; M. Smith, Bull. Raffles Mus., no. 3, 1930, pp. 53-55.

Simotes fasciolatus Günther, The reptiles of British India, 1864, p. 218, pl. 20, fig. B (type-locality "Petchabun" southeast Siam (possibly Phet Buri (Petchaburi) SW Thailand at the upper end of the peninsula).

Simotes smithi Werner, Sitz. Ber. Akad. Wiss. Wien, vol. 134, 1925, p. 58 (Siam); M. Smith, Ann. Mag. Nat. Hist., ser. 10, vol. 1, 1928, p. 497.

Coronella violacea Cantor, Proc. Zool. Soc. London. 1839, p. 50, (type-locality Rangpur, Bengal).

Oligodon cyclurus: Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Dec. 1943, pp. 202-205, figs. 62-63 (*part.*); Taylor and Elbel Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1136-1137 (Chaiyaphum, Loei and Nakhon Phanom provinces).

Diagnosis: A rather large species of the genus reaching a length of 940 mm. variable, producing a variety of forms that should be treated as subspecies; scale formula, 21, 21, 17.

Oligodon cyclurus smithi (Werner)

(Fig. 36)

Simotes smithi Werner, Sitz. Ber. Akad. Wiss. Wien, vol. 134, 1925, p. 58, (type-locality, "Don-Rek," Siam, presumably the Dong Rek mountains between Thailand and northern Cambodia.)

Oligodon cyclurus: M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 202-204, fig. 62; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1136-1138, fig. 25.

Holarchus purpurascens: Cochran, Proc. U. S. Nat. Mus., vol. 77, (2) 1930, p. 27.

Diagnosis: Brownish or yellowish brown with 15-17 black or brown spots edged with darker color, each spot separated by three narrow irregular black transverse marks, the color broken and confined to edges of scales. A strong chevron on neck extending to frontal, its posterior branches reaching about to level of 10th

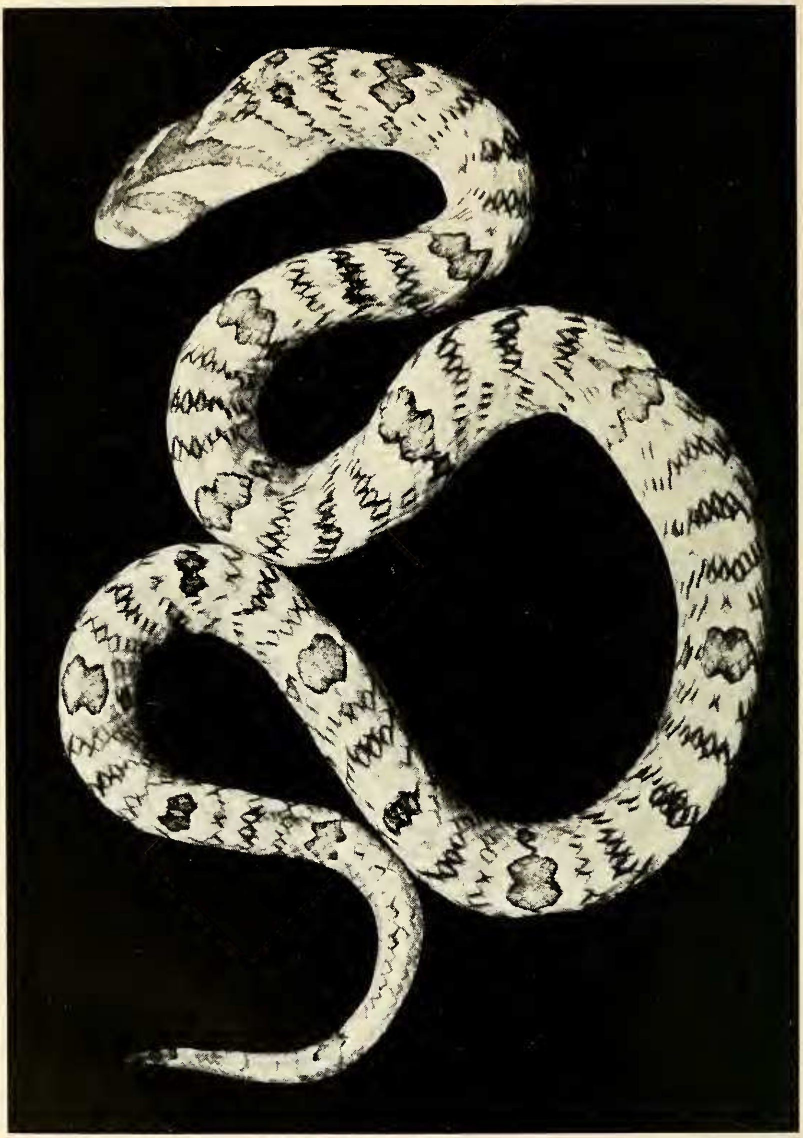

FIG. 36. *Oligodon cyclurus smithi* (Werner). EHT-HMS No. 31701 ♂, Kho (Mt.) Kanbuang, Nakae district, Nakhon Phanom province, Thailand. Actual total length, 579 mm.

ventral; a mark across snout and a stripe from occiput across jaw-angle; venter immaculate.

Description of species (from No. 33569, Ang Hin, Chon Buri): Rostral considerably wider than high, thickened and bent back over tip of snout, portion visible above triangular, its length distinctly greater than its distance from frontal; internasals diagonally placed, their mutual suture about one fourth of their diagonal length (width); prefrontals likewise narrowed greatly on mid-line their mutual suture about a fourth of the width of scale; frontal about one sixth longer than wide, its length equal to its distance from end of snout and equally as long as parietals; parietals as wide as long; nasal divided, anterior part the larger; loreal about as high as long; two preoculars, lower small, between third labial and eye; two postoculars; temporals, 2 + 2 + 3 on right side (irregular on left side); supralabials, eight, fourth and fifth border orbit, last two largest; greatest diameter of eye much less than its distance from lip, less than its distance to nostril. Mental tiny; nine infralabials; first pair of chinshields twice as large as second, bordered by four infralabials.

Scale-formula: 24 (occiput), 17, 17, 15; ventrals, 162; subcaudals, 49; anal, undivided.

Color: Above gray-brown; body with 13 or 14 somewhat faded spots on body; spots on tail obsolete; between spots three narrow dark transverse bars; black color not reaching below second scale-row; venter immaculate; nape with a large chevron-shaped mark terminating on frontal, its posterior branches terminating at level of eighth ventral; a diagonal bar from parietal across jaw-angle; a band across snout widened mesially passing back and down through eye and across fourth and fifth labials.

Measurements in mm.: Total length, 695; tail, 124; width of head, 18; length of head, 22.

Variation: No. 32043 is a light fawn-colored specimen bearing a series of black spots with white centers, the outer portion of the spots detached and forming a second row of smaller spots on each side, likewise ocellated. The outer rows and entire ventral surfaces immaculate. There are eleven spots on body and four on the tail. The tail is distinctly triangular in cross-section and terminates in a stiff spine. The ventrals are 169; subcaudals 53; scalerows 21.

Variation in ventral scale-count, in material at hand, is 161 to 185; subcaudals, 42 to 56. Most male specimens have the tail stiffened. All (except one specimen with 19), have 21 rows of scales about the middle of the body.

Distribution: This is one of the commoner snakes of Thailand. It has been found in the following provinces: Chaiyaphum, Loei, Sara Buri, Chon Buri, Nakhon Phanom, and Sakon Nakhon. It probably occurs widely in the plateau areas and the lowlands of central, eastern and southeastern Thailand. It has been taken in Bangkok and the northern part of the peninsula.

Remarks: I have found these snakes very unpleasant to handle as they bite readily. Even when the head is held in the hand the serpent has a propensity of pushing out the back part of the maxillary sidewise and biting, the posterior teeth being the ones that seem to cut the flesh to produce much bleeding.

Malcolm Smith remarks that "In disposition most of the species (of *Oligodon*) are quiet and inoffensive. *O. cyclurus* however, in my experience, is a most vicious creature."

Oligodon cyclurus superfluens subsp. nov.

(Fig. 37)

Type: No. 77, ♂ Doi Suthep, near Chiang Mai (city) at low elevation (150m.); Edward H. Taylor, Coll., Sept. 6, 1959.

Diagnosis: A large series of tiny black marks on edges of dorsal scales (usually not more than two edges of a scale dark) the marks tending to form series of transverse, sometimes angular marks, the angles directed forwards, then laterally they may form a second angle. One or two alternating scalerows may have scales edged with cream or yellow-cream, the color extending on interstitial skin. Head markings similar to *cyclurus cyclurus;* venter immaculate. Scalerows, 21 at middle; ventrals, 179, subcaudals, 47; head wide; tail rigid ending in a sharp point.

Description of type: Rostral somewhat thickened, about as high as wide; portion visable above triangular, its length above, at least as long as its distance from frontal, and tending to displace internasals to a somewhat oblique position; suture between internasals a little shorter than that between prefrontals; latter scales about twice as wide as long; frontal pentagonal; shorter than its distance from tip of snout, shorter than parietals; nasal divided, anterior part the larger; loreal quadrangular, higher than wide; two preoculars, lower (subocular) between third and fourth supralabials; two postoculars, temporals, 2 + 2 + 3, upper anterior touching both postoculars, lower anterior separated from them; supralabials eight, fourth and fifth entering orbit; nine infralabials, four touching first chinshields which are one-and-three-fourths times size of second pair.

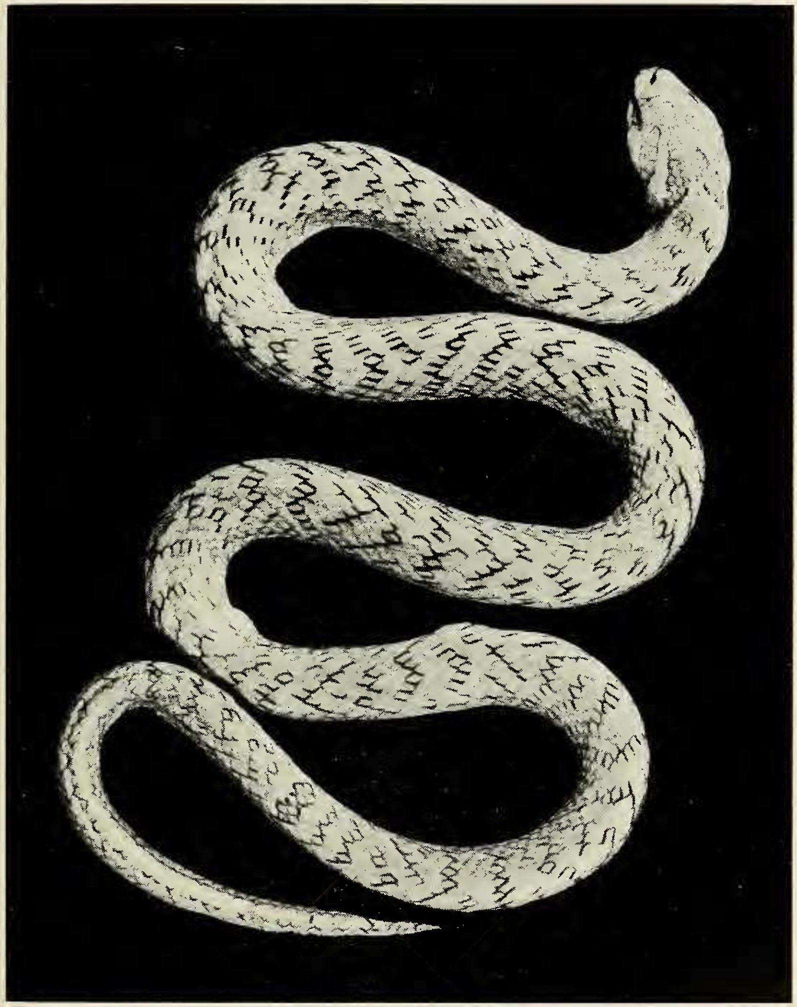

FIG. 37. *Oligodon cyclurus superfluens* subsp. nov. Type. No. 4, Doi Suthep (at low elevation, near base), Chiang Mai, Chiang Mai province, northern Thailand. Actual total length, 603 mm.; tail, 90 mm.

Scales smooth, the scalerows: 21, 21, 17; ventrals, 179; anal, single; subcaudals, 47. Tail triangular in cross-section.

Color in life: Above general body color light brownish gray with a series of about 70 transverse black marks made up of the black edges of scales; many marks are angular mesially, the angle directed backwards, the black marks not passing below second scalerows. Top of head, a little darker than on sides.

A long chevron-shaped mark on nape, its rounded apex terminating on frontal, its posterior branches reaching back to level of ninth ventral scale; two oblique bars across snout extending from front edge of frontal to rostral, narrowing, passing through eye to mouth and crossing fifth and sixth supralabials; no black marks on following labials; many transverse scalerows without black edges, but with cream marks instead, also confined to scale-edges, but extending onto interstitial skin. Towards posterior part of body a suggestion of a median whitish streak beginning at level of vent, terminating on the sharp-pointed, semi-rigid tail; sides of tail largely unicolored, with a dorsolateral trace of black marking on a slightly darker ground color; a small dark dorsal blotch an inch in front of vent level.

Measurements: Total length, 603, tail, 90; width of head, 16, length of head, 214.

Remarks: This species bears a remarkable superficial resemblance to *Oligodon cinereus multifasciata* that occurs in the same locality. There is however in this form an immaculate venter. The head-markings are wider and more strongly defined such as is typical of those in *cyclurus*. The tail is proportionally longer, triangular in cross-section, not rounded above and flat below.

Oligodon purpurascens purpurascens (Schlegel)

(Fig. 38)

Xenodon purpurascens Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 90, pl. 3, fig. 13, 14 (type-locality, Java?).

Simotes purpurascens: Boulenger, Catalogue of the snakes in the British Museum, vol. 2, pp. 218-219 (*part.*); A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 148-149.

Diagnosis: Rostral not distinctly thickened, length of part visible above less than its distance from frontal; scales in 19 rows (21); below many ventrals have quadrangular dark spots usually alternating with ventral having no spots; subcaudals numerous, 53-56 in peninsular specimens.

There are certain populations of *purpurascens* worthy of subspecific designation. Several of these have been named, but a revision of the genus will be necessary to bring about a proper understanding of the group as a whole.

Description of species (from No. 3894 Na Pradoo, Pattani, Thailand): Rostral not or scarcely thickened, not or scarcely higher than wide; part visible above triangular, its length less than its distance from frontal; internasals about twice as wide as long,

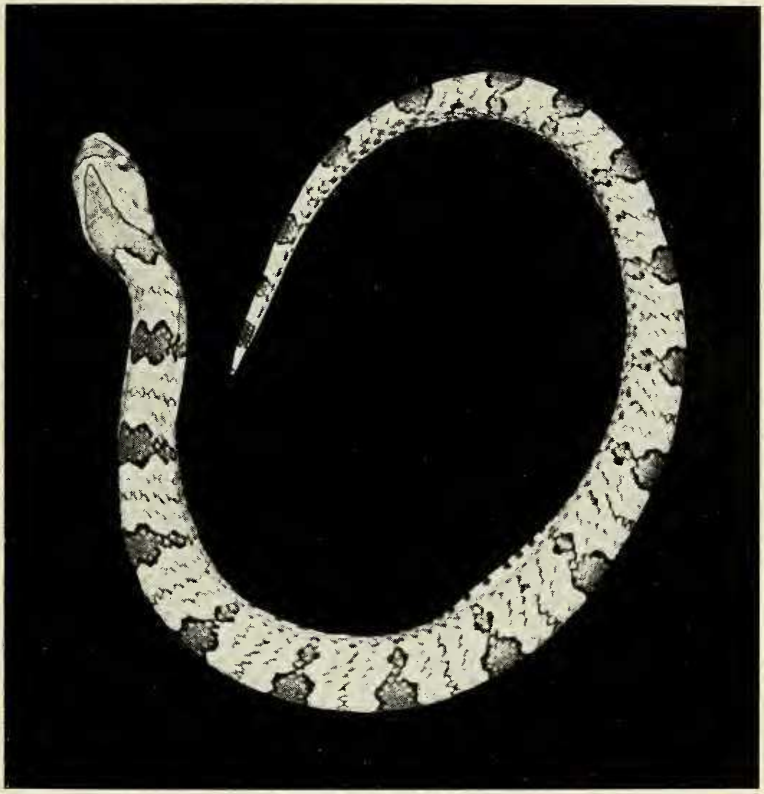

FIG. 38. *Oligodon purpurascens purpurascens* (Schlegel). No. 3894, Na Pradoo, Pattani province, Southern Thailand. Actual total length, 222 mm.; tail, 38 mm.

somewhat diagonally placed, their mutual suture a little longer than that between prefrontals; frontal much longer than wide (3.5 x 5 mm.), a third longer than its distance to tip of snout, longer than parietals; parietals a little longer than wide; anterior nasal larger than posterior; loreal higher than wide; one preocular and a very small subocular; supraocular about half greatest width of frontal; two postoculars; temporals, $2 + \frac{1}{1 + 1}$; eight supralabials, fourth and fifth bordering orbit of eye; mental narrower than rostral; 8-9 infralabials, 3-4 touching first chinshields which are more than double size of second pair; latter separated from first widened ventral by a single pair of scales.

Scale formula: 22 (occiput), 19, 19, 15; ventrals, 173; subcaudals, 56; anal, single.

Color: Above light gray-cream with a series of 19 transverse spots, (four confined to tail), the spots widening in two places dorsally, much narrower laterally and edged with black, separated from each other by an area of ground color with three thin transverse dark lines; a row of somewhat quadrangular brown spots on outer part of ventrals and subcaudals, except on neck and posterior part of tail; two ventrals with brown spots alternating with two lacking spots, or each alternate ventral bearing a spot; a curving band of brown on snout passing through eye onto fifth and sixth labials; a large arrow-shaped dark mark on nape bordered with deep brown or black, terminating on middle of frontal, deeply emarginate behind, the posterior parts terminating on each side on outer scalerow at level of ninth ventral; diagonal line from parietal across jaw-angle barely indicated; venter ivory; some small marks on tip of snout below.

Measurements in mm.: Total length, 222; tail, 38; width of head, 9; length of head, 12.2.

Variation: Boulenger (A vertebrate fauna of the Malay Penin. 1912) gives the variation in ventrals as 160 to 210; subcaudals, 40 to 60. There may be two suboculars and two preoculars; at middle of body scales are in 19 (21) rows.

Distribution: The described specimen represents the first one reported in Thai territory. It was collected by Nai Prayoon Kananuracks. Outside of Thailand it occurs in Malaya, Singapore and in many islands of the Indo-Australian Archipelago.

Remarks: Mr. Tweedie (1954) makes the following comments on the coloration in life of the young and adults: "Brown or purplish above with black-edged darker cross-bars which are broadest dorsally and may have their margins wavy; between these broad cross-bars other ill-defined narrower ones are usually present. Under surface pink or yellow with square dark spots on the ends of alternate, or more widely separated, ventrals." . . . "The whole colour pattern becomes gradually more obscure with age, but the young are quite brilliantly coloured, the ground being light brown with scattered red spots, the main cross-bars wholly black, and the underside coral pink."

He states that the scales are in 19 or 21 rows and that the serpent reaches a length of about three feet. It is quite common in wooded country.

Oligodon quadrilineatus (Jan)

(Fig. 39)

Simotes quadrilineatus Jan, Nouv. Arch. Mus. Paris, vol. 2, p. 7; Jan and Sordelli Iconographie général des ofidiens, tome. 1, livr. 12, 1865, pl. 4, fig. 3 (type-locality, Siam).

Simotes taeniatus: Boulenger, Catalogue of the snakes in the British Museum, 2nd ed., vol. 2, 1894, pp. 227-228 (*part.*); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 2, 1914, pp. 98-99.

Holarchus taeniatus taeniatus: Cochran, Proc. U. S. Nat. Mus. vol. 77, 1930, p. 28 (Bangkok, Nonthaburi, Korat, Pak Jong, Nong Mong).

Oligodon quadrilineatus: M. Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, sec. 1943, p. 210; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1140-1142, fig. 27.

Diagnosis: Two dorsal and two lateral brown stripes; dorsal lines separated by a lighter, partly yellow line; scale-formula: 19, 19, 15; no black stripe crossing rostral; four anterior labials on each side; no black spot at base of tail or near tip; a blackish chevron on nape and two oblique temporal marks; a wide black mark on snout, narrowing and crossing eyes to lip; reddish on venter.

Description of species (from No. 667 Bangkok): Rostral a little higher than wide, triangular part visible above as long as internasals; latter angular anteriorly, wider than long, their common suture about two thirds as long as that between prefrontals; latter scales one-and-a-half times as wide as long, their suture with frontal forming a straight line; frontal longer than its distance from tip of snout, only slightly shorter than parietals; nasal divided, anterior part much the larger; loreal longer than high; one preocular, two postoculars; temporals, $1 + 1 + \frac{1}{2}$, eight supralabials, fourth borders orbit, sixth and seventh largest; nine infralabials, four bordering first chinshelds which are twice size of second.

Scale-formula: 22 (occiput), 19, 19, 15; scales smooth without apical pits. Ventrals, 157; subcaudals, 41; anal, single.

Color in life: Body and head gray with two longitudinal median dorsal blackish stripes to tip of tail, separated by a narrow yellowish-white line passing through median scalerow, but not covering whole scales. Edges of the brown scales yellow, as is also interstitial skin; a lateral line on fourth and fifth scalerows terminating at level of vent; head with a transverse mark crossing frontal and back part of prefrontals, passing through eye and across fifth and sixth supralabials; a spot on frontal; two diagonal temporal stripes arising at edge

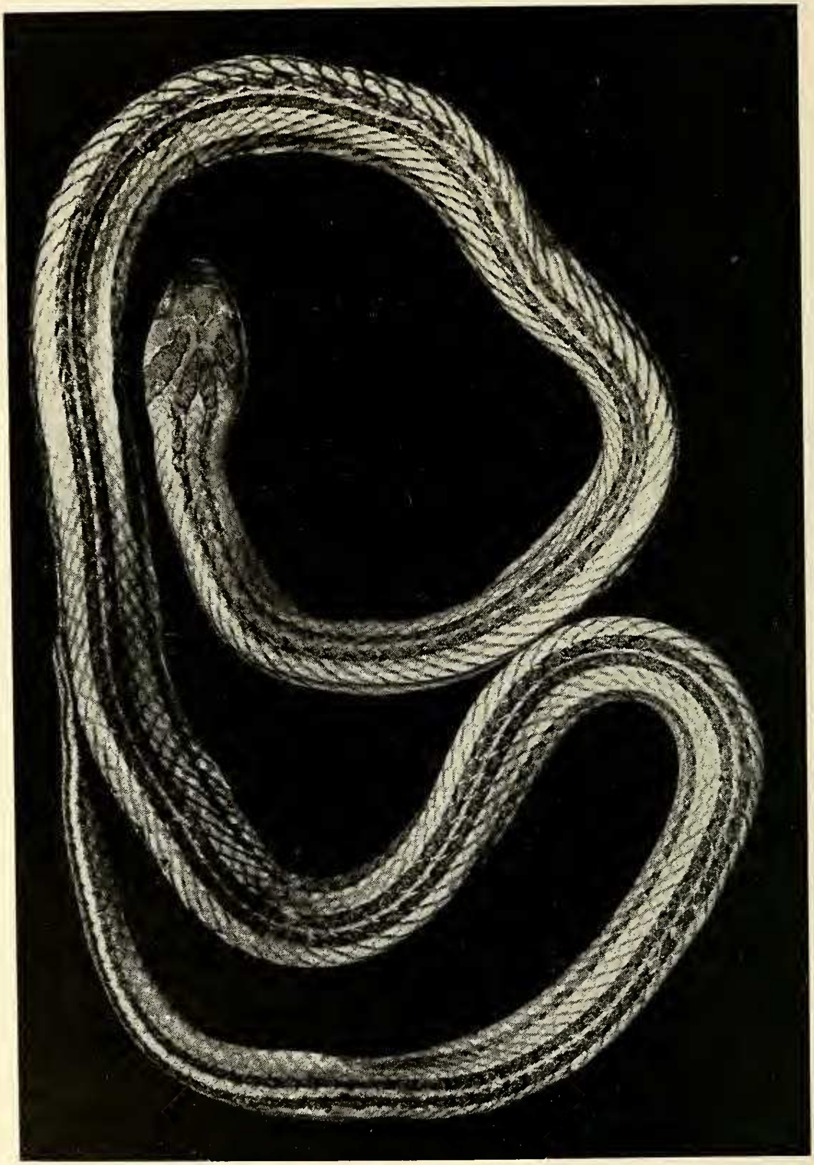

FIG. 39. *Oligodon quadrilineatus* Jan. KUMNH No. 31437, Banlat Ban Kaeng, Phukheio, Chaiyaphum province, Thailand. Actual total length, 354 mm.

of supraoculars and terminating on sides of neck; an arrow-shaped mark on neck, terminating on back of parietals connected behind with two dorsal stripes. Venter laterally angulate but bluntly so; lateral part of ventrals cream or ivory; chin and throat dirty ivory, gradually growing pink, then reddish to near tip of tail, with numerous ventrals bearing more or less quadrangular spots, forming two rows, the spots sometimes alternating, sometimes on the same ventral (rarely connected) and usually separated by a ventral lacking spots; ventral part of the tip of tail white. Most gray scales of body, under a lens, show some black along scale edges and on the interstitial skin.

Table of data on *Oligodon quadrilineatus* (Jan)

NUMBER	667	672	34166	34168	34169
Total length	375	375	388	402	342
Tail	63	64.5	67	66	62
Anal	1	16	1	1	1
Ventrals	157	15	159	157	157
Subcaudals	41	44	43	43	44
Supralabials	8–8	8–8	8–8	8–8	8–8
Infralabials	9–9	9–9	9–9	9–9	9–9
Preocular	1–1	1–1	1–1	1–1	1–1
Postoculars	2–2	2–2	2–2	2–2	2–2
Temporals	1+1+½	1+1+½	1+1+½	1+1+½	1+1+½
Scale-formula	19, 19, 15	19, 19, 15	19, 19, 15	19, 19, 15	19, 19, 15

Distribution: This species is found commonly at Bangkok in central Thailand. Specimens are known from Chaiyaphum, Nakhon Ratchasima and Sara Buri. It is presumably endemic in Thailand.

Remarks: The species apparently, in the region of Bangkok maintains its identity although the closely related *taeniatus* occurs also. They are both small forms, having a reddish venter with quadrangular spots. The latter species differs in the number of scale-rows at the middle of body (19 instead of 17), there are no large blotches on the tail, no black band bordering the front of the upper lip, and the bar on the snout is much narrower.

There is some confusion in the literature. Günther's original description of *taeniatus* stated there were 19 scale rows, but later this was corrected to 17. Boulenger, 1914 (p. 70) has overlooked the correction and proposes a new name needlessly.

The specimens listed in the table are from Bangkok.

Oligodon barroni (Smith)

(Figs. 40, 41)

Simotes barroni M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, No. 1, 1916, pp. 46-47, pl. —, fig. 4, 4a (type-locality, Hup Bon, E. of Sriracha, Chon Buri province, Thailand).

Holarchus taeniatus candaensis Bourret, Bull. Gen. Instr. Pub. Hanoi, May 1934, p. 173 (type-locality, Canda, near Nhatrang, S. Annam (*fide* M. Smith).

Oligodon barroni: M. Smith, The fauna of British India, Ceylon, and Burma . . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 210-211, fig. 66 (dorsal pattern).

Diagnosis: A small species (380 mm.) with 10-12 dark-brown transverse ventral bars tending to be confluent with small lateral brown spots; these separated by three more or less distinct dark narrow transverse markings. Near outer part of ventrals a light

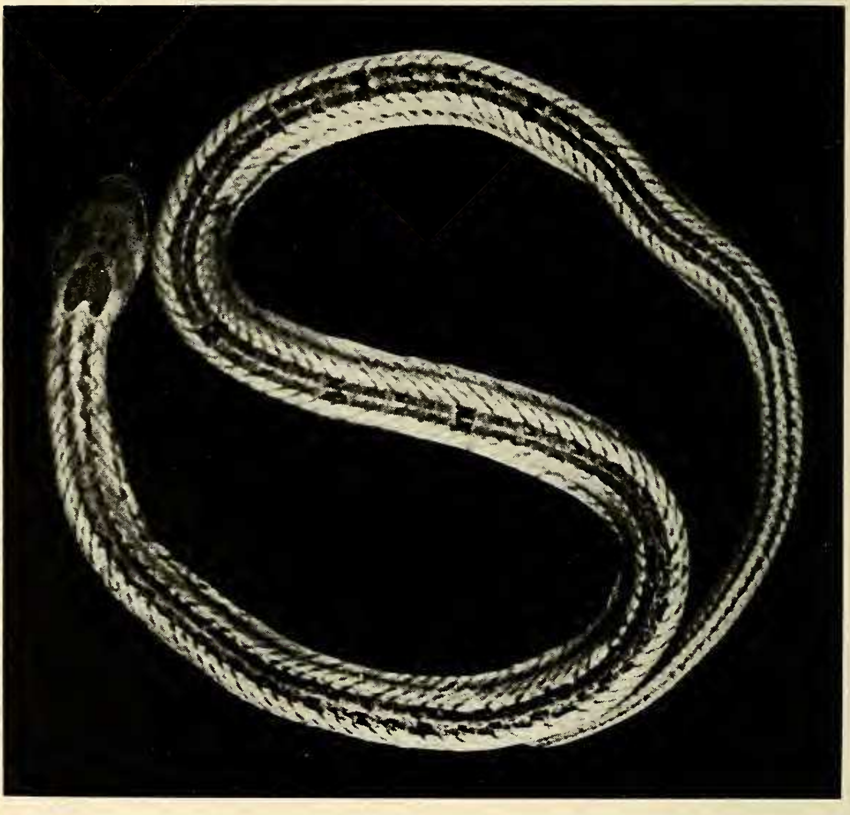

FIG. 40. *Oligodon barroni* M. Smith. No. 1719 young, Muak Lek, Friendship Highway, Sara Buri, province, Central Thailand. Actual total length, 222 mm.; tail, 36.3 mm.

line, with two ventral rows of quadrangular black spots. A broad, somewhat heart-shaped nuchal spot with a forward arm; a diagonal stripe across angle of mouth closely approximating nuchal spot, all more or less outlined with gray white; a faint pair of dorsal brownish lines with irregular spotting, and a faint lateral line, at least posteriorly; one anterior temporal; seven (eight) supralabials, two bordering orbit; 135-160 ventrals; venter coral-red, fading to white in preservative.

Description of species (from No. 33245 Ang Hin, Chon Buri): Rostral as high as wide, not thickened, well visible above, angular mesially; internasals wider than long, their common suture less

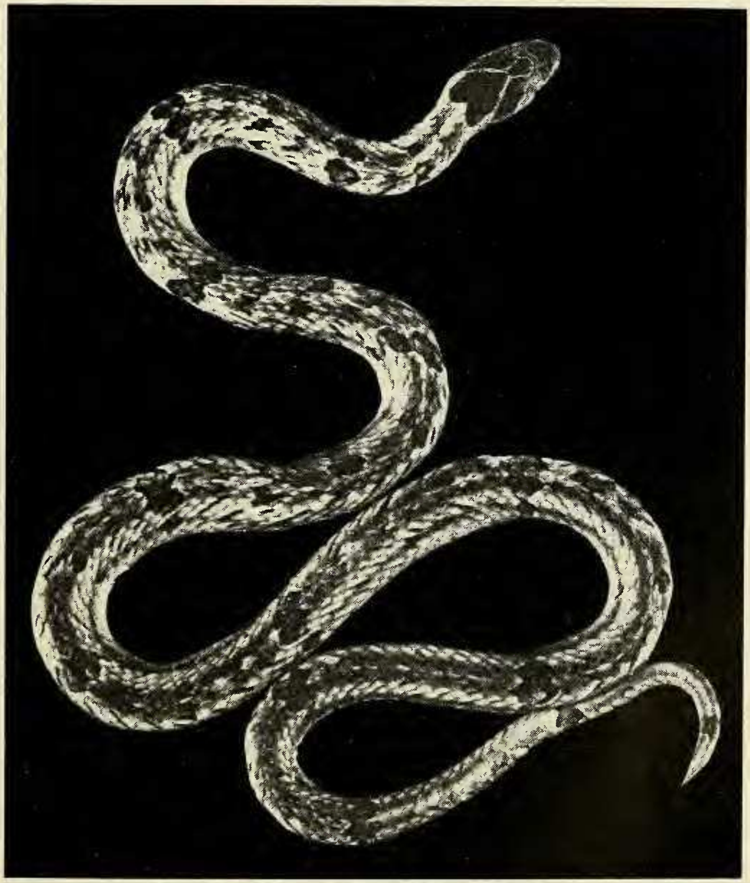

FIG. 41. *Oligodon barroni* M. Smith. No. 34149♂, Ang Hin, Chon Buri province, southeastern Thailand. Actual total length, 372 mm.; tail, 54 mm.

than one half their width; prefrontals about twice as wide as long; frontal pentagonal, front edge a straight line, sides not parallel, its length equal or slightly greater than its distance from tip of snout, shorter than parietals; nasal divided, anterior part a little larger than posterior; loreal quadrangular, longer than high; preocular narrowed above not reaching top of head; two subequal postoculars; temporals, $1 + \frac{1}{3}$; supralabials, 7-8, third and fourth (fourth and fifth) entering orbit; infralabials, 9-9, four in contact with first chinshields which are nearly double size of second pair.

Scales smooth, the formula: 17, 17, 15; ventrals, 152, anal, single, subcaudals, 46; ventrals angular laterally their outer parts turned up on sides.

Color in life: Above generally light brown with a faint trace of two dorsal stripes of darker brown and a still fainter lateral stripe; head with a dark brown transverse crescent across frontal-prefrontal area passing across eyes to terminate on fifth (sixth) labials; a small dark spot on the following labial; a diagonal stripe from parietal to third ventral; a heart-shaped nuchal spot, its apex on posterior part of parietals; all head-spots edged with gray-white; on body eleven rather distinct dark brown bars, often confluent with a lateral series of smaller spots, and mesially indented, in some cases dividing the spot; between these median spots three more or less definite narrow transverse marks; tail with four transverse bars, but intervening marks absent; chin whitish; venter pink to coral red with two rows of brown quadrangular marks, extending on to subcaudal region almost to tip of tail; rostral gray-white with two small dark vertical marks.

Measurements in mm.: Total length, 364; tail, 70.5; width of head, 8; length of head, 13.

Distribution: Only a few specimens of this species have been taken. Malcolm Smith who described the form in 1916 had three specimens from Hup Bon, Sriracha, Chon Buri. It has been taken on the island Koh Lam near Sriracha, and at Muak Lek altitude 199 ft. in Sari Buri province. My two specimens are from Ang Hin, Chon Buri. A third specimen in the collection is possibly also from this place.

Variation: The number of labials is variable. Smith reports three having seven on one side, eight on the other, while a single specimen has eight on each side. He reports one specimen lacking the larger dark spots on the anterior part of the body. In the specimen I figure, the three anterior dark spots are scarcely larger than the intervening marks.

A young specimen from Muak Lek, has a count of 160 ventrals. The dorsal brownish stripes are not mentioned in the type description. However the excellent figures show these as well as an indistinct lateral line.

Oligodon taeniatus (Günther)

Simotes taeniatus Günther, Proc. Zool. Soc. London, 1861, p. 189; The reptiles of British India,* 1864, p. 216, pl. 20, fig. A (type-locality, Cambodia); Boulenger, Catalogue of the snakes in the British Museum, 2nd. ed.; vol. 2, 1894, pp. 227-228 (*part.*); Boettger, Ber. Senckenb. Nat. Ges., 1894, p. 134, (*part.* states that *taeniatus* = *quadrilineatus*); Barbour, Proc. New England Zool. Club, vol. 4, 1909, p. 70; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, p. 98 (Bangkok).

Simotes taeniatus mouhoti Boulenger, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 70 (type-locality, "Gamboja" = Cambodia).

Holarchus taeniatus mouhoti: Cochran, Proc. U. S. Mus., vol. 77, 1930, p. 29; Bourret, Les Serpents de l'Indochine, 1936, p. 247.

Oligodon taeniatus M. Smith, The Fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, p. 208-210, figs. 64, A and B; fig. 65.

Diagnosis: A small species with a very broad band across snout, narrowing across eyes and labials; an elongate frontal spot extending onto parietals; two oblique temporal stripes reaching down onto ventrals; a symmetrical blotch on nape reaching back of parietals; reddish below except on chin and neck; numerous quadrangular black spots on venter some fusing and making bars, not arranged in rows; a median dorsal yellowish line; two dorsal darker stripes extending to tail and a lateral stripe stopping at level of vent; a spot at base and one near tip of tail; a continuous black band across anterior labials and rostral; two preoculars; eight supralabials; 17 scalerows.

Description of species (from No. 609, Hua Hin, Prachuap Khiri Khan): Rostral as high as broad, the part visible above equal to about half its distance from frontal; internasals somewhat angular anteriorly a little wider than long; prefrontals about twice as wide as long; frontal subpentagonal longer than its distance from tip of snout, a little shorter than combined parietals; nasal divided, anterior part the larger; loreal quadrangular longer than high; two preoculars, lower small, partly between third and fourth supralabials; two postoculars; first temporal small, touching both postoculars; temporal formula, $1 + 1 + \frac{1}{2}$; eight supralabials, fourth and fifth bordering orbit, last four large; eight-nine supralabials, four bordering first chinshields which are a little less than twice size of second pair; scales smooth in 17, 17, 15 rows, without pits; ventrals, 148; subcaudals, 43; anal, single.

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* The original description states 19 scale rows. In the second report Günther corrects this to 17 scalerows.

Color in life: Grayish above with two light-brown median stripes covering little more than one scalerow, separated by a narrow lighter line, the scales of which have yellow spots or edges, and much of the skin between scales also yellow. Head, anteriorly with a broad band across snout, narrowing across eyes, and extending posteriorly across three supralabials; anterior supralabials white with a band beginning on rostral extending along lip to fifth labial but not onto it; an oblique temporal band extending from parietals under neck onto ventrals, but not forming a connection; a symmetrical black blotch on neck terminating on back of parietals; an elongate spot on frontal; all head-marks outlined in whitish; venter generally pink with quadrangular spots, few anteriorly and practically none on latter part of tail, some spots joining to form bars on venter; chin ivory-white.

Measurements in mm. (of Nos. 608 ♂, 609 ♀): snout to vent, 212, 184; tail, 38, 22.5; width of head, 6, 5.8; length of head, 10, 9.8.

Variation: The second specimen measured is a young female. The ventrals are 157, the subcaudals, 32. The tail is complete. In color and general squamation the two specimens agree almost perfectly. They are from the same locality.

Malcolm Smith, *loc. cit.* records the total length of one male specimen as 340 mm.; the tail 60 mm. A second female specimen as 330 mm. the tail 45. The variation in ventrals is 146 to 169; in subcaudals, 30 to 47.

Distribution: The species is not uncommon at Bangkok where it occurs with *Oligodon quadrilineatus*. Specimens have also been taken in "Siam between lat. 12° and 16° N"; Prachuap Khiri Khan. Outside of Thailand the species is known in Cambodia and Cochin China.

Remarks: My specimens were found under piles of recently cut grass on the golf course at Hua Hin.

Addenda: Malcolm Smith, *loc. cit.*, 1943 gives the range of this species in Thailand as "Siam between lat. 12° and 16° N." Two recently acquired specimens show the range extending somewhat farther south. EHT-HMS No. 3490 is from the city of Songkhla, collected by Dr. Robert Elbel; and EHT-HMS 3908, Na Pradoo, Pattani, collected by Nai Prayoon Kananuracks.

In these the median blackish figure on the neck reaches to the frontal but does not connect with the two blackish diagonal bars crossing jaw-angles and bending across the throat forming a continuous unbroken bar on throat in one, while in the other the mark is interrupted mesially. The Songkhla specimen has only about ten scattered quadrangular spots; the Na Pradoo specimen is almost immaculate for nearly eight centimeters and two centimeters from tip of tail, while the remainder is heavily spotted with black bars or quadrangular black spots alternating. The venter of the Songkhla specimen was salmon pink. That of the Na Pradoo specimen, now cream, may have been so colored in life.

The ventral-subcaudal counts are respectively, 146, 42, and 155, 42.

Na Pradoo is 7° North latitude.

Oligodon joynsoni (Smith)

Simotes longicauda joynsoni M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 4, Dec. 1917, pp. 276-277 (type-locality valley of the Maa Yome, Muang Ngow, Northern Thailand).

Holarchus longicauda: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 4, no. 4, July 25, 1922, p. 208 (*part.*).

Oligodon joynsoni: M. Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, p. 218, fig. 72 (dorsal pattern).

Diagnosis: A medium-sized species (760 mm. in length); bodily configuration similar to *cyclurus;* eight supralabials; a subocular and a preocular present; scales smooth in 17 rows at middle of body, 15 shortly behind middle; ventrals feebly angulate; dark purplish brown with strong black reticulations forming more or less distinct but broken crossbars, each alternate one with a transversely placed black spot; venter red in life, heavily marked with rectangular black spots; a narrow chevron terminating on head; a crescent spot across eyes and snout; two temporal bars. Ventrals, 187-197; subcaudals, 40-50.

Description of species (data from type description): Rostral bent over tip of snout, portion visible above as long as its distance from frontal; suture between internasals shorter than that between prefrontals; frontal longer than its distance from end of snout, as long as parietals; loreal slightly longer than deep; one preocular (usually one presubocular) and two postoculars; temporals, 1 + 2 (or 1 + 1 + 2, anterior small); eight supralabials, fourth and fifth bordering orbit; five infralabials touching first chinshields which are twice as large as posterior pair; nasals divided.

Scale-formula: 17, 17, 15, 15, the reduction taking place just posterior to mid-body; ventrals, 190; anal, single; subcaudals, 47; maxillary teeth, 12, steadily increasing in size posteriorly; palatine teeth, 7, pterygoid, 14.

Color: Purplish brown above with ill-defined broken bands across back, every alternate one enlarged into a dorsal blotch, about 50 altogether on body and tail; below yellowish white with rather large black quadrangular spots not reaching outer lateral part of ventrals; a large dark-brown crescentic band in front, passing across prefrontals and through eyes; an oblique temporal streak present, and a narrow chevron on nape terminating on frontal.

Measurements in mm.: Total length, 760; tail, 105.

Variation: A second specimen differs in having the frontal shorter than the parietals, a subocular present, and only seven supralabials on left side (due to fusion of the second and third). The ventrals are 187, the subcaudals 50. It is light brown above, the dorsal blotches being scarcely enlarged. Below it is uniform yellowish white. Other specimens show that the subocular below the preocular may be absent and there may be one or two anterior temporals. Ventrals vary between 187 and 195, the subcaudals between 43 and 50. The venter is always reddish in life.

Remarks: Smith himself seems to have had some doubts as to the validity of this species. In 1922 he referred the form to *Oligodon longicauda.* He states: "the difference in colouration between them was far less than I gathered from the description, so much so that mine can no longer be recognized as a form apart." However in 1943 he recognizes *joynsoni,* not as a subspecies of *longicauda,* but as a distinct species. Not having examined material of this species I accept Smith's 1943 decision as to its status.

Distribution: Known only in the type-locality and from Me Wang, Northern Thailand.

Genus *Liopeltis* Fitzinger

Liopeltis Fitzinger, Systema reptilia, 1843, p. 26 (type of genus, *Herpetodryas tricolor*).

Gongylosoma Fitzinger, *ibid.*, p. 25 (type of genus, *Coronella baliodeira.*

Ablabes Duméril, Mem. Acad. Sci. Paris, vol. 23, p. 454 (type of genus, *Coronella baliodeira*).

Diagnosis: Small snakes, scales in 13-17 rows around body (13 in Thai forms), not reducing posteriorly; apical pits lacking; one preocular, one or two postoculars. Maxillary teeth, 24-28, about equal in size in Thai species. Head not or scarcely distinct from neck in Thai species.

Two species are recognized in Thailand: *scriptus* and *baliodeirus.* The latter is represented by a recently described subspecies *b. cochranae.* The two forms may be separated by the following key:

1. Ventrals, 115-137; subcaudals, 58-75; eight supralabials; several dark bands around anterior part of body; two preoculars; two postoculars, *baliodeirus cochranae*
2. Ventrals, 117-145; subcaudals, 89-103; supralabials eight; a narrow interrupted band across occiput, bordered with black, followed by a broad somewhat darker saddle-shaped blotch..........................*scriptus*

Liopeltis baliodeirus Boie *in* Boie

Coronella baliodeira Boie *in* Boie, Isis, 1827, 539 (type-locality, Java): Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 64, pl. 2, figs. 9, 10 (including a "*var.*" in Sumatra); Cantor, Journ. Asiat. Soc. Bengal, vol. 16, pt. 2, 1847, p. 913.

Ablabes baliodeirus: Duméril, Bibron and Duméril, Erpétologie générale . . . 1854, p. 313; Günther, Catalogue of the colubrine snakes in the collection of the British Museum, 1858, p. 29; The reptiles of British India, 1864, p. 224; Flower, Proc. Zool. Soc. London, 1899, p. 673; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 152; Catalogue of the snakes . . . vol. 2, 1894, pp. 283-284.

Diadophis baliodeirus: Jan, Arch. Zool. Anat. Fis., vol. 2, 1863, 263; Jan and Sordelli, Iconographie générale, livr. 15, pl. 5, fig. 4.

Gongylosoma baliodeirum: Sworder, Singapore Nat., no. 2, 1922, p. 65; *ibid.*, no. 3, 1921, p. 22 (Singapore). M. Smith, Bull. Raffles Mus., no. 3, 1930 pp. 56-57.

It is obvious from the variation reported, that several subspecies of this snake exist. Schlegel recognized a "*var.*" in Sumatra. (Schlegel, Atlas, on—"Tableau servant a illustrer la répartition des serpent a la surface du globe"). J. A. Fisher, described *Ablabes baliodirus* var. *cinctus* (Abh. natur. Ver Hamburg, vol. 9, 1886 (1885), p. 8, pl. 1, fig. 2, from Nias).

I have not seen specimens of this species from Malaya. It is known in Penang, Province Wellesley and on Bujong Malacca, Perak (*fide* Boulenger, 1912).

Whether any of these specimens are the same as the form described here, remains to be ascertained.

Liopeltis baliodeirus cochranae Taylor

(Fig. 42)

Liopeltis baliodeirus cochranae Taylor, Univ. Kans. Sci. Bull., vol. 43, 1962, pp. 261-263, fig. 18 (type-locality, Khao Soi Dao, Thailand).

Diagnosis: Thirteen scalerows around body; nostril between two nasals fused above nostril; head scarcely distinct from neck; two preoculars, two postoculars; eight supralabials, the fourth and fifth border eye; 24-25 maxillary teeth; neck with eight or nine black bands (reaching to ventrals) all except first, third, and fourth interrupted on median dorsal line.

Description of type: Head a little wider than neck; rostral not twice as wide as high, narrowly visible above on snout; internasals wider than long, much smaller and narrower than prefrontals; latter much broader than long, laterally touching loreal, posterior nasal, and upper preocular; frontal shield-shaped, longer than its distance from tip of snout, shorter than parietals; nostril between two nasals that are fused above nostril, the posterior nasal largest, distinctly higher than anterior nasal; a small loreal; two preoculars, upper not reaching upper surface of head; supraoculars large, not as wide as frontal; two postoculars; a single large anterior temporal followed by two superimposed temporals much shorter than anterior; eight supralabials in the following order of size: 3, 2, 1, 6, 4, 5, 8, 7; the fourth and fifth enter orbit; mental triangular, first labials in contact behind it; seven infralabials, first three touch first chinshields which are much shorter than second pair.

Scalerow-formula: 17 (occiput), 13, 13, 13: scales smooth, without apical pits. Ventrals, 118; subcaudals, 72; anal, divided.

Color: Head nearly uniform light brown; on side of head very slight dark marks evident along sutures of some labials and a fine dark rim on edges of scales marking outline of orbit; on occiput the brown tends to become blackish in front of first cream bar which is angulate anteriorly and almost broken on side; this followed by a series of eight or nine blackish bars (some of which are broken by a middorsal light line), and separated by dull cream or fawn-colored bars; dark and light bars becoming less distinct posteriorly where they fade into the uniform, finely reticulated pattern of violet brown, each scale with a diamond-shaped light, gray-lavender center,—a pattern that continues to tip of tail. Outer edge of ventrals

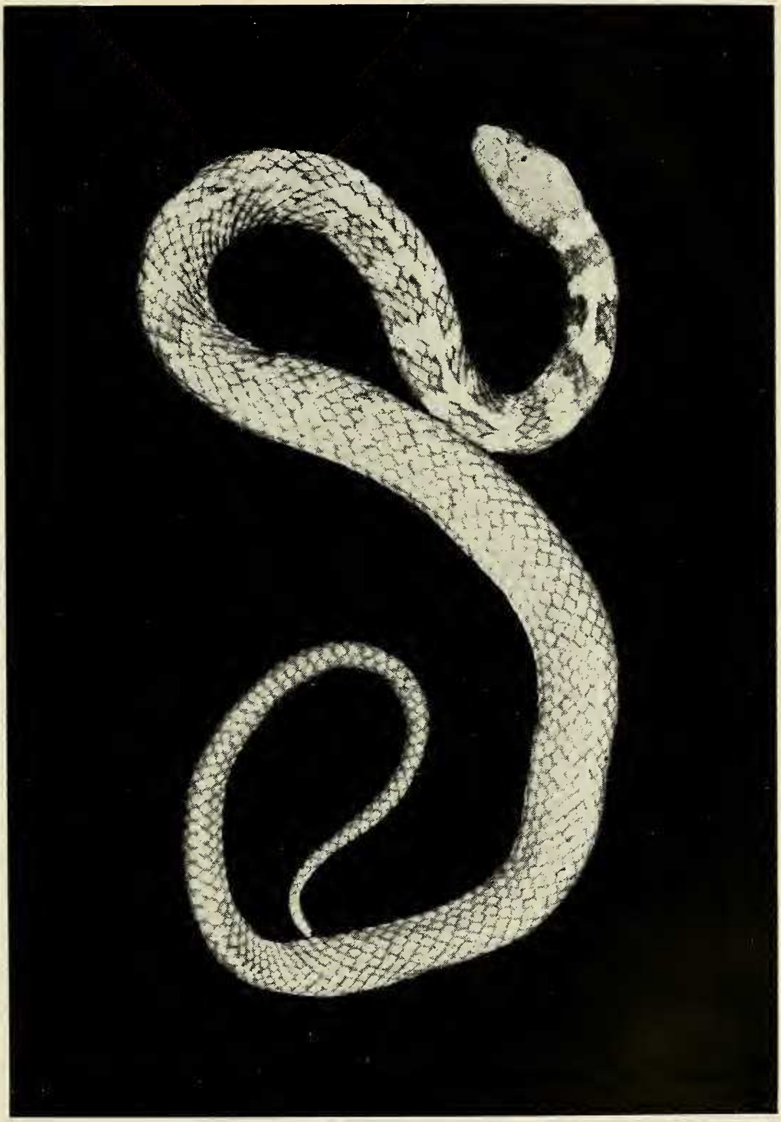

FIG. 42. *Liopeltis baliodeirus cochranae* Taylor. Type, USNM No. 94826 (6343), Khao Soi Dao, Thailand. Actual total length, 374; tail, 118. (From Taylor, 1962.)

and subcaudals with a violet-brown line separating the uniform whitish color of underside of head, body, and tail from the dorsal coloration.

Measurements in mm.: Snout to vent, 256; tail 118; total length, 374; width of head, 9.1; length of head, 14.

Remarks: Another species of the genus, *Liopeltis scriptus* (Theobald), also occurs in peninsular Thailand and specimens have been taken in the Nakhon Si Thammarat Mountains (Khao Luang and Ronpibon), and on Pulau Panjang (Island) of Phuket.

The differences are considerable in these two forms, both having 13 scalerows about the body. In *b. cochranae* ventrals are fewer, 118 compared with 122-145; the subcaudals fewer, 72, compared with 87-103. There are two instead of three supralabial scales bordering orbit; the nasals are partly fused (two separate), and the anterior temporal is wider and somewhat shorter than in *L. scriptus.* The subspecies in known only from the type-locality.

Liopeltis scriptus (Theobald)

(Fig. 43)

Ablabes scriptus Theobald, Journ. Linnean Soc., vol. 10, no. 41, Zoology, 1868, p. 42 (type-locality, Martaban, Burma); Catalogue of the reptiles in the museum of the Asiatic Society of Bengal (Extra no. of Jour. Asiat. Soc. Bengal, 1868, p. 49); Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 305-306; Catalogue of the snakes in the British Museum, 2nd ed. vol. 2, 1894, p. 284.

Liopeltis scriptus: Wall, Journ. Bombay, Nat. Hist. Soc., vol. 29, 1924, p. 864.

Gongylosoma scriptum: Cochran, Proc. U. S. Nat. Mus., vol. 77, pt. 2, 1930, p. 30; M. Smith, Bull. Raffles Mus., no. 3, 1930, pp. 56-57 ("Petchaburi District" Thailand; Telok Poh, Phuket; Khao Luang, Nakhon Si Thammarat); The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 186-187, fig. 57.

Diagnosis: Small snake, reaching about half meter in length; scales in 13 smooth rows throughout body; eight supralabials, third and fourth entering eye; anterior temporal longer than secondary temporals; a narrow black-edged broken cream band across occiput, preceding a dark neck band; supralabials cream with some black along certain sutures.

Description of species (from No. 35587 Ronpibon, Nakhon Si Thammarat): Rostral not twice as wide as high, visible above; internasals moderately large touching nasals laterally, smaller than prefrontals; latter nearly twice as wide as long, touching posterior nasal, loreal, and preocular laterally; frontal longer than its distance from tip of snout, shorter than parietals; nasal divided, anterior part angular and a little the larger, posterior part rounded behind;

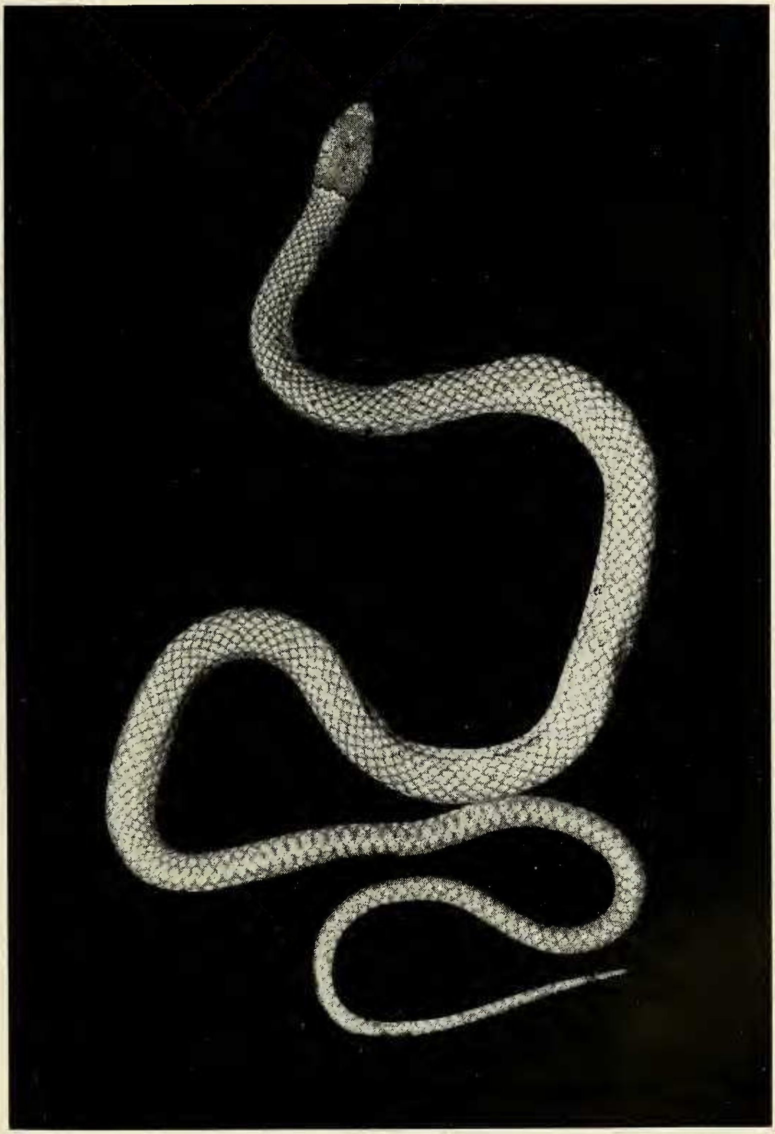

FIG. 43. *Liopeltis scriptus* (Theobald). No. 35587, Ronpibon, Nakhon Si Thammarat, Thailand. Actual total length, 355 mm.; tail, 152 mm.

loreal small, a little higher than long; single preocular high and narrow, but not reaching top of head; supraoculars little more than half width of frontal; two postoculars both touching anterior temporal; temporals, 1 + 2, anterior longer than posterior; eight supralabials, third, fourth, and fifth border orbit; seventh distinctly the largest; diameter of eye equal to its distance from rostral; eight infralabials, last very small, first four border first chinshields which are shorter than second pair.

Scales in 13 rows around body; ventrals, 122; anals, 2; subcaudals, 103 (104).

Color: Above generally grayish, scale edges darker brown; two outer scalerows with edges of scales less distinctly marked except on scales bordering third scalerow, where edges are a little more heavily marked, leaving a slightly darker line the length of body. Head gray to brownish gray above, anterior part dimly flecked with darker; side of snout light fawn with dark marks on rostral, nasal sutures, and on first and second supralabials; a narrow black ring around eye, widening considerably on labials below eye; a cream line from fifth and sixth labials pushes up back of eye partially bordered behind by black; a black-edged cream line from eighth supralabial reaches to or nearly to parietal; a dark band four or five scales wide on neck, bordered narrowly by cream posteriorly; venter and subcaudal region cream.

Measurements in mm.: Snout to vent, 203; tail, 152; total length, 355; width of head, 6.3; length of head, 12.

Variation: USNM No. 76103 is also from Nakhon Si Thammarat. It has 133 ventrals and 98 subcaudals. The head and body measure 240 mm., the tail 160 mm.; it differs in having two preoculars and the light transverse mark behind the dim nuchal band is scarcely discernible; a few tiny punctate black flecks present for about two inches behind head.

The ventrals are known to vary between 122 and 145, the subcaudals, 87 to 103.

Distribution: In Thailand the species is known from Sai Yoke, Kanchanaburi province; Khao Luang and Ronpibon, Nakhon Si Thammarat; Pulao Panjang (Island), Phuket.

It has not been reported outside Thailand except in Burma (Martaban), the type-locality.

Genus *Dryocalamus* Günther

Dryocalamus Günther, Catalogue of the colubrine snakes in the British Museum, p. 112 (type, *D. tristrigatus*).

Diagnosis: Eye large with a vertical pupil; scales in 13 or 15 subequal rows, normally imbricating, with apical pits present. Hypapophyses lacking on posterior body vertebrae. Maxillary bone curving inward anterior to palatine; teeth on maxillary 8 to 10, increasing in size posteriorly.

The genus ranges from India throughout southeastern Asia, Malaya to the Philippines. One species is known from Thailand.

Dryocalamus davisonii (Blanford)

(Fig. 44)

Ulupe davisonii Blanford, Journ. Asiat. Soc. Bengal, vol. 47, 1878, p. 128 (type-locality, Nawlabu Hill, East of Tavoy, Burma); Proc. Zool. Soc. London, 1881, p. 221.

Hydrophobus davisonii: Boulenger, Fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 299.

Dryocalamus davisonii: Boulenger, Catalogue of the snakes in the British Museum, vol 1, 1893, p. 372; Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 616; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 93; Bourret, Les Serpents de l'Indochine, 1936, p. 168; M. Smith, Fauna of British India, Ceylon and Burma, including the whole of the Indo-Chinese Subregion; Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 274-275. Taylor and Elbel, Univ. Kan. Sci. Bull., vol. 38, pt. 2, 1958, p. 1044 (listed as *D. davidsonii* [*sic*]).

Diagnosis: Nostril in a single nasal; no preocular, loreal entering orbit of eye; scales in 13 rows; black above, banded with white or pale green; bands posteriorly shorter than anteriorly; subcaudals paired.

Description of species (from No. 1283, collection of Dr. Boonsong Lekagul): Rostral much wider than high (3.3 × 1.7 mm.), broadly visible above, forming a slight median angle on its upper border; internasals distinctly longer than prefrontals but less wide, narrowed anteriorly, anterior and posterior sides parallel; prefrontals with a slight angle on their posterior border, laterally broadly in contact with loreal, narrowly so with nasal; frontal approximately as long as its distance from end of snout, and equal to its distance from posterior level of parietals; parietals in contact for four-fifths of their length; supraoculars widened posteriorly.

Nostril in an undivided nasal scale somewhat rectangular in shape; preocular absent; loreal broadly entering orbit of eye; eye large, pupil vertically elliptic; two postoculars; anterior temporals, one on right, two on left side; temporal formula, $1 + 2 + 2 + 3$ (right side), $2 + 2 + 1 + \begin{array}{c}1\\ \hline 3\\ \hline 2\end{array}$ (left side); seven upper labials, third and fourth enter orbit; eight lower labials, anterior four touch first

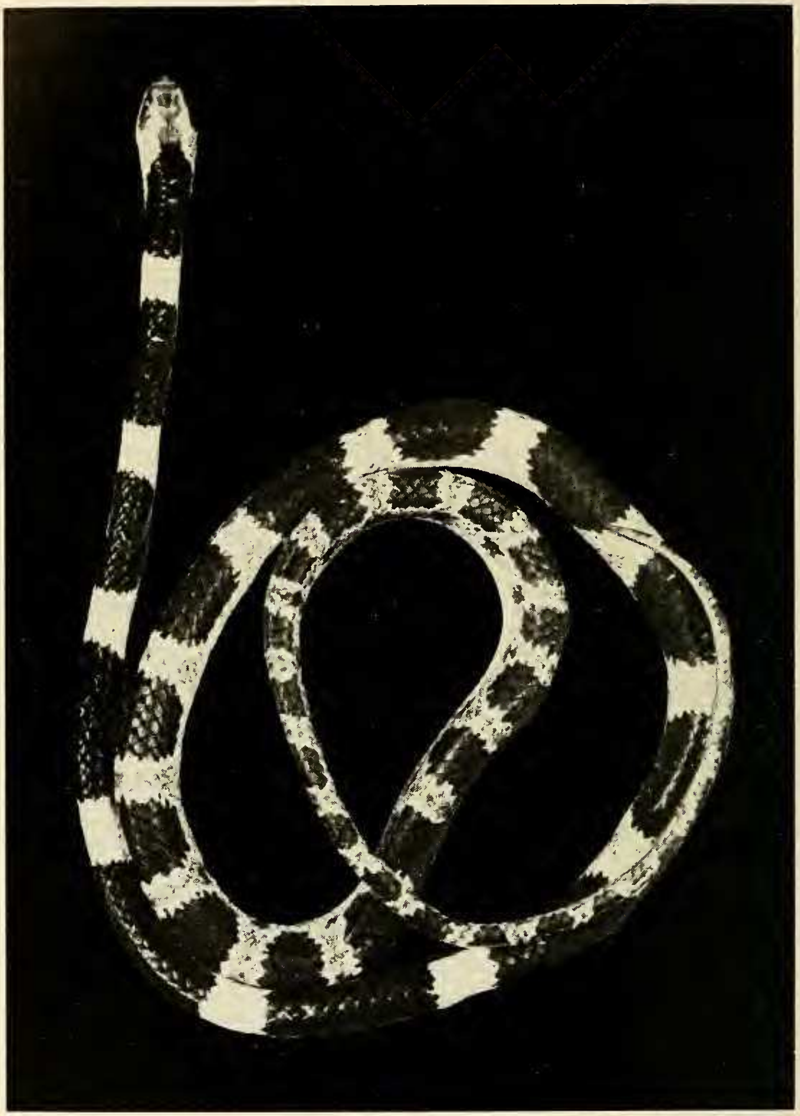

FIG. 44. *Dryocalamus davisonii* (Blanford). No. 900♂, Chalermlaub, Sriracha, Chon Buri province, southeastern Thailand. Actual total length, 444 mm.; tail, 74 mm.

chinshields which are more than double size of posterior pairs; four pairs of chinshields.

Scalerow formula: 17 (occiput), 13, 13, 13; scales small with single apical pits; ventral scales, 233; subcaudal scales, 92; anal, single; ventrals keeled, with a slight notch on each side.

Color: Above with 27 black saddle-shaped blotches narrowed laterally, reaching to ventrals (anteriorly) and posteriorly to outer scalerow or to second or third outer row near vent; the length of saddles anteriorly are equal to 13 scale-lengths; farther back to eight scale-lengths growing gradually shorter to five and four preceding level of vent; a second series, at first small, begins on second row at 14th blotch and continues to vent, growing larger and alternating with dorsal blotches. The intervening lighter areas, whitish anteriorly, become cloudy with darker pigment except for a single row of scales bordering dark blotches. The light intervening areas are widened laterally and narrowed dorsally, the edges of both light and dark areas being denticulate; head with a light brown mark covering frontal region to snout with a median posterior mark reaching to first dorsal blotch and to posterior projection passing through eye and onto two temporals; posterior occipital region with a dusting of pigment; chin and venter nearly pure white with a few dark spots on latter fifth; considerable pigment on subcaudals, dense mesially.

Measurements in mm.: See table.

Measurements in mm. and scale data on *Dryocalamus davisonii*

NUMBER	1283	1756 ♀	900 ♂
Snout-vent length	536	557	370
Tail length	152	164	74
Total length	688	721	444
Width of head	9	10.3	7
Length of head	14.6	16	12
Ventrals	233	238	238
Subcaudals	92	95	61+
Preoculars	0	0	0
Postoculars	2	1	1
Supralabials	7	7	7
Chinshield, pairs	4	4	4

Variation: Known variation in ventral count is between 233 and 255, the subcaudals between 90 and 108. The loreal may enter the eye. Seven or eight supralabials are present.

The species reaches a length of 920 mm.; the tail 205 mm.

Distribution: In Thailand specimens have been reported between 18° and 11° north latitude. I have taken the species in Chalermlaub, Sriracha, Chon Buri from under the bark of a stump. M. Smith reports two specimens taken from Sapatoom, Bangkok.

The species ranges from Burma to Indo-China.

Remarks: This is a lowland species and cannot be considered common. The eggs of the species are remarkably elongate. Smith (1943) reports the size of four laid by a captive specimen as measuring 39 mm. × 9 mm.

Genus *Plagiopholis* Boulenger

Plagiopholis Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 301, (type of genus, *blakewayi*).

Trirhinopholis Boulenger, Catalogue of the snakes in the British Museum, vol. 1, 1893, p. 419, (type, *nuchalis*).

Diagnosis: Maxillary teeth 16-20, small subequal; nostril between two nasals; eye with a vertical subelliptical pupil; scales smooth or with keels posteriorly on body and base of tail; scales in 15 rows, more or less obliquely arranged, without apical pits. Body cylindrical, head not distinct from neck; subcaudals all or mostly divided; hypapophyses throughout vertebral column; mental touching first chinshields.

Four species are recognized. These are distributed through Burma, northern Thailand, southern China, and Indo-China.

A single species, *Plagiopholis nuchalis,* has been taken in Thailand, this from the area north of latitude 13°.

Plagiopholis nuchalis (Boulenger)

(Fig. 45)

Trirhinopholis nuchalis Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 419, pl. 38, fig. 1, (type-locality, Toungyi, S. Shan States); *ibid.*, vol. 3, 1896, p. 612; Ann. Mus. Civ. Genova, ser. 2, vol. 13, 1893, p. 323; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 2, Mar., 1915, pp. 155, 213, (specimens from near border of Thailand, Sai Yoke district); Journ. Bombay Nat. Hist. So., vol. 23, 1915; Wall, *ibid.*, vol. 29, 1923, pp. 466, (Sinbur Kaba, Upper Burma), 612; *ibid.*, vol. 30, 1925, p. 811, (13 specimens, Kachin Hills and Kut Kai, North Shan Hills, Burma); *ibid.*, vol. 31, 1926, p. 561; Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, June, 1934, pp. 302-304.

Plagiopholis nuchalis: M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 484; The fauna of British India, Ceylon, and Burma including the whole Indo-Chinese subregion, Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 326-327.

Oligodon evansi Wall, Journ. Bombay Nat. Hist. Soc., vol. 22, 1913, p. 514, fig., (type-locality, Toungyi, S. Shan States) and *ibid.*, vol. 27, 1920, p. 175, [= *P. nuchalis*].

Diagnosis: A small snake (470 mm.) resembling somewhat a species of *Oligodon;* ventrals, 122-142, subcaudals, 23-30; six supralabials; loreal present; 15 scalerows, smooth except in anal region; first infralabials separated by first chinshields, which touch mental.

Description of species (from No. 33635, Doi Suthep, Chiang Mai, north Thailand): Rostral broader than high, part visible above

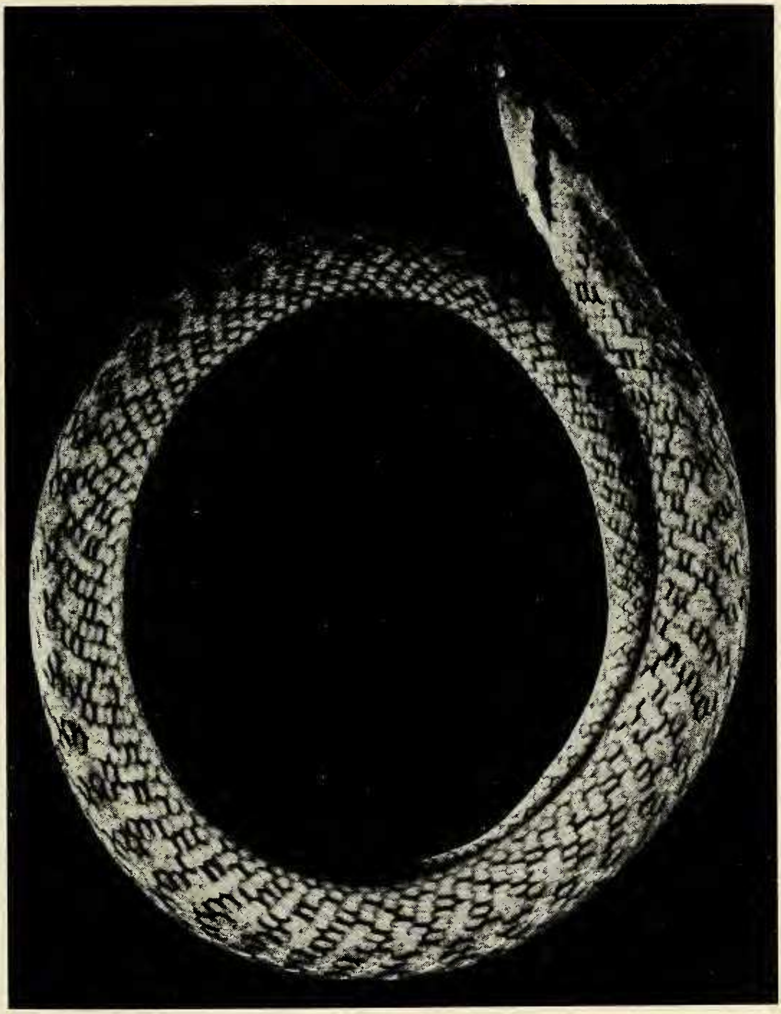

FIG. 45. *Plagiopholis* nuchalis (Boulenger). No. 33635, Doi Suthep, at Forest Station, Chiang Mai, Chiang Mai province. Actual length, 238 mm.; tail, 26 mm.

about equal in width to suture between small internasals, which are less than half area of prefrontals; frontal much longer than its distance to end of snout, slightly less than length of parietals; scales bordering temporals and parietals somewhat larger than body scales; each prefrontal is fused to frontal by a narrow isthmus (presumably abnormally but symmetrically); nostril between two nasals; a quadrangular loreal present, touching one labial; a vertically elongate preocular; a broad supraocular; two postoculars; temporals, 1 + 2; six supralabials, third and fourth enter eye, fifth much the largest, sixth second in size; six infralabials, three touching large anterior chinshields, which are considerably larger than second pair; first infralabials separated behind mental; scales smooth except near tail in 15 rows throughout, those of two outer rows largest; scales arranged somewhat obliquely (but not conspicuously so) and keeled in posterior part of body.

Diameter of eye much larger (nearly double) its distance from mouth; ventral scales, 126; anal, single; subcaudals, incomplete.

Color in life: Somewhat reddish brown with many of the scales edged with black and forming about 56 single or double transverse dark markings across back, which may connect to form a reticulum; ventral scales yellowish, with irregular rows of rather large rectangular black marks on each side of venter and in subcaudal region; head yellowish olive with a strong chevron-shaped black spot pointing forwards and terminating at parietals; chin and throat yellowish as far as fourth ventral; two vertical dark marks below eye.

Table of measurements and data on *Plagiopholis nuchalis*

NUMBER	33635	19890	675 ♀
Total length	238	....	376
Tail	26	....	42
Width of head	8	....	9.5
Length of head	12.1	....	16
Supralabials	6	6	6
Infralabials	6	6	6
Temporals	1+2	1+2 1+½	1+2
Supralabials in eye	3, 4	3, 4	3, 4
Ventrals	126	129	128
Subcaudals	?	29	28
Maxillary teeth	19	19	20
Scale formula	15–15–15	15–15–15	15–15–15

All from Doi Suthep, Chiang Mai.

Variation: The subcaudals are normally divided but occasionally some may be single. The ventrals vary from 122 to 142; subcaudals, 23 to 30. The reticulation may leave a dorsolateral series of rounded black spots connected with each other by brown crossbars or a series of obliquely placed light brown, black-edged, crossbars. Rarely the spots on venter may be absent.

A second specimen, No. 675 ♀, was taken at an elevation of approximately 1,000 meters on Doi Suthep. The specimen was found crawling in short grass where it moved with considerable rapidity for a snake of its size and structure.

The chevron terminates on the parietals but more or less connects with a blackish line which outlines the frontal and the sutures that touch the frontal. Besides the heavy black bars on venter, a great deal of the remaining surface is heavily peppered with gray pigment.

Distribution: The species seems to be confined to Burma and Thailand. It has been taken at the Thai-Burmese border in the Sai Yoke district, Kanchanaburi province; at Chiang Mai, Doi Ang-Ka, and Doi Suthep, Chiang Mai province; Khun Tan. The specimen here described is from Doi Suthep.

Remarks: In general appearance this snake resembles that of a species of the genus *Oligodon,* having a characteristic chevron on the neck. The separation of the first labials will easily separate *Plagiopholis* from *Oligodon.* There are 17 small maxillary teeth of nearly equal size, the first one or two smallest.

M. Smith has united *Plagiopholis* Boulenger with *Trirhinopholis* an action followed here without certainty that this represents the true relationship.

Genus *Pseudorabdion* Jan

Pseudorabdion Jan, Arch. Zool. Anat. Fis., Genova, vol. 2, 1862, p. 10 (type, *Rabdion torquatum*).

Diagnosis: Small snakes; eye not covered by scutes; internasals and prefrontals present; supraocular present; no anterior temporal; five or six supralabials; scales in 15 longitudinal rows, smooth, without apical pits; anal single, subcaudals double.

The genus is distributed in the Malay Peninsula and in the Indo-Australian Archipelago as far as the Philippines. A single species occurs in Thailand.

Pseudorabdion longiceps (Cantor)

Calamaria longiceps Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1947, p. 910, pl. 40, fig. 1 (type-locality "Pinang" = Penang).

Oxycalamus longiceps: Günther, The reptiles of British India, 1864, p. 199; Stoliczka, Journ. Asiat. Soc. Bengal, vol. 42, 1873, p. 120; Blanford, Proc. Zool. Soc. London, 1881, p. 218 (Singapore).

Pseudorhabdion longiceps: Boulenger, Ann. Mag. Nat. Hist., ser. 5, vol. 16, 1885, p. 389; Bourret, Les serpents de l'Indo-Chine, 1936, p. 226, fig. 105; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 57 (Bangnara = Narathiwat,

Narathiwat); Leviton and Brown, Proc. California Acad. Sci., ser. 4, vol. 29, no. 14, May 29, 1959, pp. 481-486 (literature list); Tweedie, Snakes of Malaya, 1954, pp. 51-52, fig. 12, a and b; *ibid.*, 2nd Ed., 1957, pp. 33, 133, figs. 13, a and b.

Pseudorhabdium longiceps: Boulenger, Catalogue of the snakes in the British Mus., 2nd Ed., vol. 2, 1894, p. 329; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 154; Flower, Proc. Zool. Soc. London, 1896, p. 886; Robinson and Kloss, Journ. Federated Malay States Mus., vol. 8, 1920, p. 303; Sworder, Singapore Nat., 1923, p. 65; Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 161; Journ. Federated Malay States Mus., vol. 10, 1922, p. 267 (Frazer's Hill, Malaya).

Rhabdion torquatum Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, pp. 119-122, (type-locality, "Macassar"); Peters, Mon. Akad. Wiss. Berlin, 1861, p. 684.

Pseudorhabdion torquatum: Jan and Sordelli, Iconographie générale des ophidiens, 1865, livr. 10, pl. 3, fig. 3.

Diagnosis: A diminutive snake reaching a length of little more than 200 mm. Slate-gray above and below; scales in 15 rows throughout length of body; anal single; mental in contact with the first chinshields; internasals small, one third size of prefrontals which are but little less in size than frontal; parietal touching labials; ventrals, 141; subcaudals, 19.

Description of species (from No. 35560 Bhetong, Yala province): Rostral higher than wide, part visible above forms a very small triangle; internasals less than a third as large as prefrontals, separated from labials; prefrontals very large, touching three first labials, the first very narrowly; frontal only a little larger than prefrontals, longer than its distance from tip of snout, about three times as broad as narrow supraoculars, much shorter than parietals; nostril pierced in anterior end of single nasal; no loreal; one small preocular, one postocular, the latter touching two labials. No anterior temporal, posterior temporal very large; six supralabials, first smallest, fifth largest, third and fourth entering orbit; six infralabials, first pair small, widely separated, first three touching first chinshields which are nearly double size of second pair and in contact with mental; eye diameter greater than distance of eye to mouth.

Scale-formula: 15-15-15, scales without apical pits. Ventrals, 141; subcaudals, 19; anal, single.

Color in life: Slate-gray or bluish gray, scales with slightly lighter edges; ventrals grayish brown, posterior edges slightly lighter; top of head darker than sides; some lighter marking on chin and labials.

Measurements in mm.: Total length, 208 mm.; tail, 15.5; head width, 4.2; head length, 7.3; greatest width of body (female with eggs), 7 mm.

Distribution: The species is known in Thailand only in the two southernmost provinces, Yala and Narathiwat. Outside of Thailand the species occurs in Malaya and has been reported in Sumatra, Borneo, Celebes, and the Philippines. Leviton and Brown (1959) question the Philippine reports.

Remarks: I collected this small specimen about four kilometers from Bhetong, Yala province, on the edge of a rice-paddy ditch, among dead leaves. The specimen is a gravid female containing three eggs. Another specimen was taken by me on Singapore Island.

Genus *Calamaria* Boie

Calamaria Boie, Isis, 1826, p. 981; *ibid.*, 1827, p. 519, 539 (type of genus, *linnaei*); M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 236-237 (fixation of type).

Diagnosis: Small cylindrical snakes, head not or scarcely distinguished from neck. Eye with a round pupil, the nostril pierced in a tiny nasal; loreal absent; internasals and prefrontals fused; supraocular reduced; preocular present or absent; scales smooth, in 13 scalerows; subcaudals paired; no apical pits. Maxillary teeth eight to eleven, all curving, subequal.

Five species of this typically Malayan genus *Calamaria* enter Thailand.

They may be distinguished by the following key:

KEY TO THAI SPECIES OF CALAMARIA

1. First pair of labials not in contact behind mental; chinshields and mental touch; five supralabials, third and fourth enter eye; venter ivory with numerous blackish or slate bars; tip of tail pointed.......... *vermiformis*
   First pair of labials in contact behind the mental; tip of tail variable..... 2
2. Five supralabials; frontal four times as wide as supraocular; chin and venter ivory-white (head color variable); third and fourth supralabials border eye; tail pointed.. *leucocephala*
   Four supralabials;.. 3
3. No nuchal dark band bordered by yellow; nearly uniform blackish or brownish violet above; second scalerow with light dots on each scale; venter ivory (pinkish in life?); tail ending in a rounded scale....... *uniformis*
   A nuchal dark band bordered with yellow.......................... 4
4. Five rows of black dots on dorsum; frontal twice as wide as supraocular; tail pointed, lacking paired white spots; venter white except that lateral pigment extends onto ends of ventrals.................... *p. pavimentata*
   Nuchal black band bordered fore and aft with yellow. Two (or three) pairs of yellow spots on tail; ventrals strongly edged with brown or gray, in older specimens venter nearly uniform gray.............. *siamensis*

Calamaria vermiformis Duméril, Bibron, and Duméril

Calamaria vermiformis Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, pp. 85-87 (type-locality, Java); Jan and Sordelli, Iconographie générale des ophidiens, livr. 10, pl. 2, fig. 3; Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 2, 1894, p. 333-335 (*part.*) *ibid.*, vol. 3, 1896, p. 646; A vertebrate fauna of the Malay Peninsula; Reptilia and Batrachia, 1912, pp. 155-156 (Perak, 4,000 ft.); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 162 ("Bangnara, Patani" = Narathiwat, Narathiwat); Bull. Raffles Mus., no. 3, 1930, p. 57 (not recorded north of Patani = Narathiwat); de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 153-154 (*part.*) (Sumatra, Java, Borneo, Natuna Ids., Ternate, Malay Peninsula); Tweedie, The snakes of Malaya, 1954, p. 49, fig. 11.

Diagnosis: Small snake, usually under 400 mm. in length; five supralabials, third and fourth border eye; first chinshields in contact with mental, separating first labials; frontal not twice as broad as supraocular; 13 scalerows. Tail terminating in a point.

Dark brown or black above; head often partially or entirely yellowish or whitish; outer scalerows whitish; yellowish beneath with large black transverse spots.

Description of species (from B. M. No. 1900.6.14.21 Larut Hills, Perak, 4000 feet): Rostral about one-and-one-half times wider than high, well visible above; internasals and prefrontals fused, the combined scales narrowed anteriorly, laterally touching nasals, two labials and a preocular; frontal shield-shaped about twice width of supraocular, a little shorter than its distance from tip of snout, shorter than parietals; nostril in a single small nasal scale that is about one third of area of first labial; preocular not reaching upper surface of head; supraocular moderately large; a single postocular touching parietal and fifth supralabial; five supralabials, fifth much the largest, third and fourth bordering eye; no anterior temporal, but one large secondary; mental as wide as lower edge of rostral, in contact with anterior chinshields, which are in contact with three labials, and distinctly larger than second chinshields; the two pairs of chinshields nearly enclosing a large azygos scale that separates second pair; mental groove poorly developed.

Scale-formula: 13, 13, 15. Ventrals, 164; anal, single; subcaudals (divided except last), 27; tail ending in a definite spine, directed downwards.

Color: Above brownish lavender on the nine dorsal scalerows; two outer scalerows with an ivory stripe covering greater part of both rows (on outer row only on tail); infralabials, chin, and throat (for one-half inch), ivory; venter transversely barred with dark slate and ivory; bands irregular in width, and ivory bands between them also irregular and flecked with slate; lower half of supralabials ivory, with a more conspicuous ivory-white area covering large fifth supralabial, which color is not continuous with the ventrolateral ivory stripe.

Measurements in mm.: Snout to vent, 345; tail, 43; total length, 388; width of head, 9.1; length of head, 13.5.

Variation: It is a generally accepted idea that this species has what are called numerous color-forms, some very strikingly different from the one described here. The specimen described is from a Malayan locality relatively near the border of Thailand.

Distribution: A single specimen, taken in Thailand although not so stated is probably from "Bangnara" [= Narathiwat, Narathiwat] which is one of the border provinces (formerly a part of the province of Pattani). The specimens reported by Malcolm Smith in Thailand and Malaya up to 4,000 ft. all belong to this color form. Tweedie, *loc. cit.,* however reports a form different from this as follows: "The mountain form, which occurs above 3,000 feet, is dark brown above and each scale is bordered above and below with white so that narrow white lines run along the body between the scalerows. The belly is sharply and regularly barred black and yellowish-white." Tweedie gives the ventral range as 147-210; subcaudals 15-26.

Addenda: A specimen of this species acquired in 1961 at Maxwells Hill, Malaya, EHT-HMS No. 3179 ♂, has the following characteristics: The anterior chinshields are nearly double the size of the second pair; this second pair is widely separated by a single scale so that the mental groove is short and is very poorly indicated (as if approaching a condition in which the groove was absent; three postparietal scales (one abnormally large) between the upper secondary temporals. Ventrals, 168; subcaudals, 26; scale-formula: 13-13-13. The tail is equally as large in diameter as the body preceding vent. On one side of the neck five adjoining scales on rows three and four are fused to form as many large scales (normal on the left side). Total length, 383 mm.; tail, 35mm. The two outer scalerows are cream to ivory. It would be well to reexamine the presumed color varieties to ascertain whether or not they should be regarded as subspecies.

Calamaria leucocephala Duméril, Bibron, and Duméril

Calamaria leucocephala Duméril, Bibron, and Duméril, Erpétologie générale 1854, pp. 83-85 (type-locality, unknown); Günther, The reptiles of British India, 1864, p. 198 ("probably from British India"); Boulenger, Catalogue of the snakes in the British Museum (Natural History) 2nd Ed., vol. 2, 1894, p. 344; Flower, Proc. Zool. Soc. London, 1899, p. 674; Boulenger, A vertebrate fauna of the Malay peninsula . . . Reptilia and Batrachia, 1912, p. 157; M. Smith, Bull. Raffles Museum, no. 3, Apr. 1930, pp. 58-59. Bourret, Les serpents de l'Indochine, vol. 2, 1936, pp. 268-269; Tweedie, The snakes of Malaya, 1953, 1954, p. 50 ("pink headed reed snake"); ? Marx and Inger, Fieldiana; Zoology, vol. 37, June 19, 1955, p. 193 (Singapore; may be a distinct local race).

Calamaria lumbricoidea var. Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 908 (? Malaya).

Calamaria nigro-alba Günther, The reptiles of British India, 1864, p. 198, pl. 18, fig. c (type-locality, Penang).

? *Calamaria agamensis* Bleeker, Nat. Tijdschrift. Nederland-Indië, vol. 21, 1860, p. 292 (*fide* M. Smith) (type-locality, Sumatra).

Diagnosis: A large *Calamaria* reaching a length of 450 mm. The tail 48 mm. Rostral much broader than high; frontal about four times as wide as supraocular; a pre- and postocular; five supralabials, first pair of infralabials in contact behind mental. Above blue-black, highly iridescent; chin, venter, and all or much of outer scalerow ivory white; subcaudals dimly barred with violet; a dim median subcaudal line; tail pointed posteriorly.

Description of species (from No. 3178, collected at Na Pradoo, Pattani, southern Thailand): Rostral distinctly wider than high, part visible above less than half length of prefrontal suture; no internasals; prefrontals very large, a little longer than broad, broadly in contact with second labials, barely touching first labials; frontal distinctly broader than long, its width about four times as great as width of supraocular, its length equal to its distance from tip of snout, and slightly less than its distance from posterior part of parietal; parietals large, longer than wide, their length about equal to their distance from tip of snout; nostril lunate, pierced in a small single nasal that is equally as long as first labial; a preocular; supraocular nearly as wide as long; postocular touching two labials and parietal; no anterior temporal; secondary temporal elongate, bordering parietal laterally; three scales behind parietals intervening between two secondary upper temporals; a smaller median, and a pair of wider postparietals; five supralabials, second touches preocular, third and fourth border eye, fifth largest, broadly in contact with parietal. Five infralabials; first pair broadly in contact behind mental, first three scales border first pair of chinshields; latter a little larger than second pair but scarcely as broad, second pair in contact with each other for less than one third of their length.

Scales very smooth; scale-formula: 15 (occiput), 13, 13, 13. Ventrals, 149; subcaudals, 35, divided, except last which is conical; ventrals separated from chinshields by a row of three small scales.

Color: Above, from snout to tip of tail, dark bluish-black, strongly iridescent. Anteriorly second scalerow ivory-white or partially so for about 60 mm.; outer row completely ivory-white anteriorly but dorsal color encroaches so that posteriorly only lower edge of row is white; fifth labial largely ivory-white, as are lower edges of other supralabials; entire chin, throat, and venter ivory-white; subcaudals with dim lavender transverse bars on each scale, and a median longitudinal lavender line of same color.

Measurements in mm.: Total length, 362; tail, 54; width of head, 7.9; length of head, 9.8; width of body, 8.

Variation: Considerable variation has been reported in the color of the head. Sometimes it is pure white as suggested by the name, but often this is not so. Tweedie mentions a "pink head" in some of his specimens. Malcolm Smith (*loc. cit.*) has shown that this variation occurs with specimens having a different marking. The preocular may be absent or present in the same series. Despite this fact, subspecific forms may exist in its relatively wide range from Thailand to Java, Sumatra and Borneo. The variation in number of ventrals for males is from 134 to 149; subcaudals, from 24 to 37. For females, 152 and 21. (Data taken by Malcolm Smith on six specimens from Sumatra.)

Distribution: In Thailand, the species is known only from Na Pradoo, Pattani, southern Thailand where a specimen was collected by Nai Pryoon Kananuracks, which he has made available to me for study.

Marx and Inger (*loc. cit.*) refer to this form three specimens probably from Singapore Island. They report four specimens with the preocular entering the orbits which is not true of the type or specimens I have examined in the Kuala Lumpur Medical Institute or in two other specimens, one from Fraser's Hill and the described form. It is not certain what form they had before them since they state, "These specimens agree with all published descriptions of this form."

I have not had any of the white-headed forms for examination. A Fraser's Hill specimen (EHT-HMS No. 3147 ♂) has 134 ventrals and 31 subcaudals. The color is similar to the described specimen, but each scale appears to have a wide transparent border on the sides and tip. I have referred it to this species.

Other variant characters are: the shape of the nostril is different, the nasal partially or completely divided, the second pair of chinshields narrowly in contact anteriorly, and there is a narrow contact between the first infralabials behind the mental.

Calamaria uniformis M. Smith

(Fig. 46)

Calamaria pavimentata uniformis M. Smith, Proc. Zool. Soc. London, 1921, p. 426 (type-locality, Langbian Peaks, S. Annam, 6000 ft.); The fauna of British India . . . Reptilia and Amphibia; vol. 3, Serpentes, 1943, pp. 238-239.

Diagnosis: A large calamarian (455 mm.), nearly uniformly blackish to brownish violet; dorsal scales somewhat darker on edges; second scalerow with small yellowish or light violet dots on each scale; a cream-white line on lower three fourths of first scalerow; subcaudal area immaculate; scales in 13 rows; five infralabials, the first two in contact behind mental; tail ending in a blunt rounded scale; no nuchal collar or nuchal black spot; no white spots on tail; frontal twice as wide as subrectangular supraoculars; ventrals, 192 ♀, 163 ♂; subcaudals, 18 ♀, 22 ♂.

Description of species (from No. 36529, northern Chiang Mai (province), Gordon Young collector, 1960): A large calamarian; rostral as wide as high, broadly visible above; no internasals; prefrontals almost as large in area as frontal, laterally in contact with two supralabials, a preocular and a nasal; frontal longer than wide, twice as wide as supraocular; its length greater than its distance to end of snout, equally as long as its distance to end of parietal; nostril pierced in a very small triangular nasal scale surrounded by three scales; one small preocular touching prefrontal, supraocular, and second supralabial; a small postocular touching parietal and two supralabials; no anterior temporal; a large elongate secondary temporal bordering parietal; no loreal; four supralabials, second and third bordering eye, fourth largest; five infralabials, first pair in contact behind mental, three anterior ones border first chinshields; second chinshields but little smaller than first pair, in contact for about three fourths of their length; vertical diameter of eye less than its distance from oral margin.

Scale-formula: 15 (about occiput), 13, 13, 13; scales smooth, lacking apical pits. Ventrals, 192; anal, single; subcaudals, 18, divided (except last).

Color: Above iridescent blackish or brownish violet on head, body, and tail, the periphery of scales somewhat darker; body somewhat lighter on sides; lower three fourths of first (outer) scalerow, cream or ivory; second row with lighter median spots, yellowish on anterior sixth, becoming very light violet on remainder of body and less distinct; lower part of supralabials cream-white; chin and

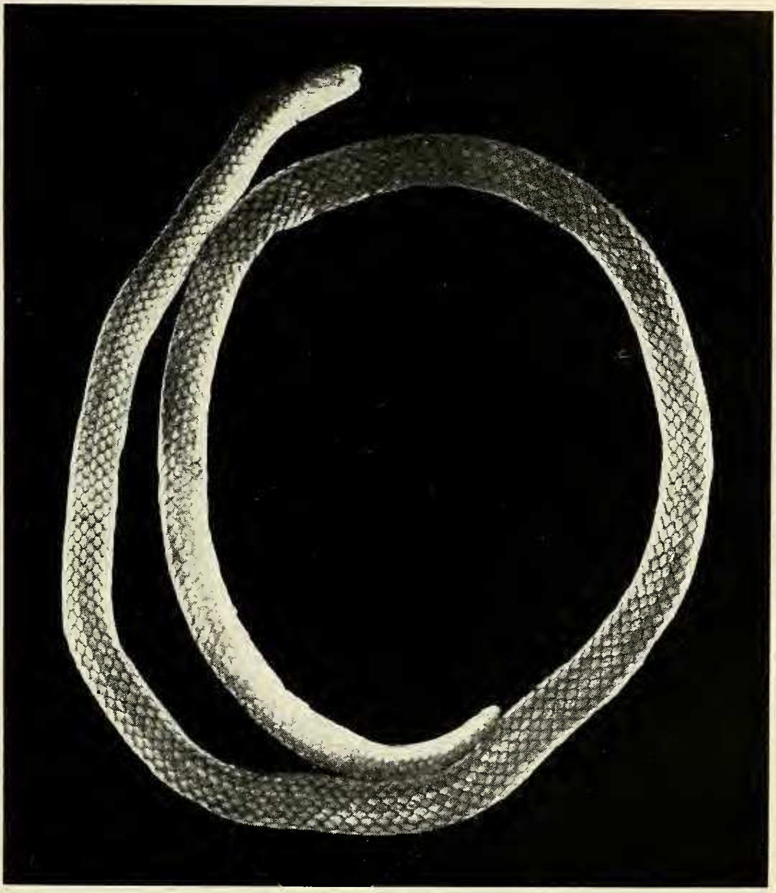

FIG. 46. *Calamaria uniformis* M. Smith. No. 36529, northern Chiang Mai province, northern Thailand. Actual total length, 445 mm.; tail, 24 mm.

infralabials with some dim darker clouding; throat and venter ivory to yellowish cream (pinkish in life?); subcaudal region similar to venter, save that scales of lower caudal scalerow have whitish spots surrounded by darker pigment.

Measurements in mm.: Total length, 455; tail, 24; width of head, 6; length of head, 11; width of body, 9.

Remarks: The single specimen was collected by Gordon Young in the northern Thai province of Chiang Mai, on Doi Suthep a mountain arising near the city. I have examined a specimen (No. 62) presumably of this form, from Cambodia in the Vienna Natural

History Museum. The squamation of the head is practically identical. There are however, only 163 ventrals and 22 subcaudals in this male specimen. The larger number of ventral scales in the described female specimen (192, 29 more than in this specimen) may be due to sex. They are practically identical in color and markings save that the described specimen is of a darker brown and the head is a trifle narrower proportionally.

In the Cambodian specimen there is a faint trace of a darker median line and the outer scalerow has the scale sutures with the ventrals pigmented which is not true of the Thai specimen. In neither specimen is there a trace of median ventral spots, and the subcaudal spots are poorly distinguished.

Distribution: The species is presumably confined to Thailand, Viet Nam and Cambodia. Only known from Chiang Mai province in Thailand.

Calamaria pavimentatus Duméril, Bibron, and Duméril

Although several subspecies have been recognized in this species, only a single one has been found in Thailand. I regard it as the typical one. The type-locality, however, is Java.

Calamaria pavimentata pavimentata Duméril, Bibron and Duméril *

Calamaria pavimentata Duméril, Bibron and Duméril, Erpétologie générale . . . vol. 7, pt. 1, pp. 71-73 (type-locality, Java); Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 282 (*part.*); Catalogue of the snakes in the British Museum, 2nd Ed. vol. 2, 1894, p. 348 (*part.*); Werner, Verh. Ges. Wien, vol. 46, 1896, p. 18; Flower, Proc. Zool. Soc. London, 1896, p. 886; *ibid.*, 1899, p. 675; Laidlaw, Proc. Zool. Soc. London 1901, p. 577; Wall, Proc. Zool. Soc. London, pp. 93, 101; Mocquard, Rev. Coloniale, 1907, p. 45; Boulenger, The vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 157; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1914, p. 213, Proc. Zool. Soc., London, 1921, p. 426; Journ. Federated Malay States Mus., vol 10, 1922, p. 267; Robinson and Kloss, Journ. Federated Malay States Museum, vol. 8, 1923, p. 364; Werner, Zool. Jahrb. vol. 57, 1928, p. 174; Brongersma, Treubia, 1929, p. 67; Smith, Bull, Raffles Mus, no. 3, Apr. 1930, p. 59.

Calamaria pavimentata pavimentata (*part.*) Bourret, Les serpents de l'Indochine, vol. 2, 1936, pp. 270-271, fig. 107. (The drawing shows the mental touching the chinshields. Two subspecies are named.)

Diagnosis: A black collar preceded and followed by yellow; five deep-black rows of dots on dorsum; first pair of infralabials in contact behind the mental; venter yellow; a median line under tail; four supralabials.

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* It is entirely possible that certain of these references actually refer to other species or subspecies.

Description of species (from No. 3165, (102) Na Pradoo, Pattani, southern Thailand): Rostral about as broad as high, well visible above; no internasals; prefrontals large, touching two labials laterally, and notched anteriorly by a minute nasal; frontal longer than wide, its sutures with supraoculars parallel, its length greater than its distance to end of snout, and greater than length of the common parietal suture; length of parietal about equal to its distance from tip of snout; nostril pierced in a minute nasal; a small preocular; supraocular less than half width of frontal; a postocular present; an upper secondary temporal borders parietal; no anterior temporal; four supralabials, second and third entering orbit, fourth very large, bordering parietal; mental broader than long; first infralabials in contact behind mental; five infralabials, first three in contact with first pair of chinshields; second pair of chinshields a little smaller than first pair, and in contact only anteriorly. Tail pointed.

Scale formula: 17 (occiput), 13, 13, 13. Scales smooth; ventrals, 153 ♂ ; anal entire; subcaudals 15.

Color: Above rather reddish brown on body with a median and two lateral series of tiny black spots, one spot to each scale in third, fifth, and median scalerows; first, second, fourth and sixth rows with light spots, whitish on two anterior rows, but cream or very light brown on dorsum; spots larger and more regular anteriorly; top of head dark; a black band or bar on neck followed by a yellow ring; chin and throat white, the light color reaching up almost to parietal and covering lower parts of three posterior labials; venter ivory-white except that lateral color extends onto ends of ventrals and subcaudals, lightly so anteriorly, strongly so posteriorly. An indistinct median line extends for some distance under tail.

Measurements in mm.: Total length, 161.5; tail, 10.5; head, width, 3.8; length of head, 5.4; width of body, 4.

Remarks: There is no absolute certainty that the form described here is subspecifically identical with the *Calamaria pavimentata* of Duméril, Bibron, and Duméril from Java. I do not regard it as being subspecifically related to *siamensis*. The strong differences in color, in pattern, in the number of ventrals, in body proportion all suggest strongly a specific relationship.

In *siamensis* the width of the body in total length is about 56-58 times; in *pavimentata pavimentata* here described the width in body length is about 40 times.

A recently acquired young specimen of *Calamaria pavimentatus* measures 336 mm.; tail, 25. It agrees with the described form in essential details. The ventrals are 164, subcaudals, 21. The coloration is brownish with a dim median row of darker flecks, broken at irregular intervals, evident throughout the body but stronger anteriorly. The second scalerow has a series of ivory spots surrounded by body color. The first scalerow is ivory except on upper edges of scales; some brownish flecks on last three infralabials, and a few subcaudal flecks near end of tail.

Calamaria siamensis Günther

(Fig. 47)

Calamaria siamensis Günther, The reptiles of British India, 1864, p. 196 (type-locality, South Laos); Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 60, 66; Theobald, Catalogue of the reptiles of British India, 1876, p. 140; Boettger, Ber. Offenb. Ver. Nat., 1885, p. 121.

Calamaria pavimentatus (*part.*): Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 282; Catalogue of the snakes in the British Museum (Natural History), vol. 2, 1894, p. 348-349.

Calamaria pavimentata: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, p. 213.

Diagnosis: Small, slender snakes usually under 350 mm. in length; 13 scalerows; internasals fused with prefrontals; nasal very small, no loreal; frontal longer than wide; no anterior temporal; large secondary temporal; four supralabials; a black nuchal band bordered with yellow fore and aft; two or three pairs of yellow spots on tail. Ventrals all strongly edged with black, brown or gray; in older specimens most of each ventral scale covered with pigment.

Description of species (from no. 36530, northern Chiang Mai, Thailand): Rostral distinctly wider than high; length of part visible above, about .4 of length of suture between prefrontals; latter scales larger than frontal, touching two supralabials laterally; frontal longer and about twice as wide as supraoculars, longer than its distance from tip of snout, more than one third shorter than parietals; nasal minute, between three scales; a small preocular; a postocular touching four scales; no anterior temporals; a moderately large secondary temporal; four supralabials, fourth nearly quadrangular bordering parietal, very much larger than second; second and third border orbit; vertical diameter of eye equal to or slightly greater than its distance from oral border; five infralabials, first three touching first chinshields which are truncate anteriorly and larger than second

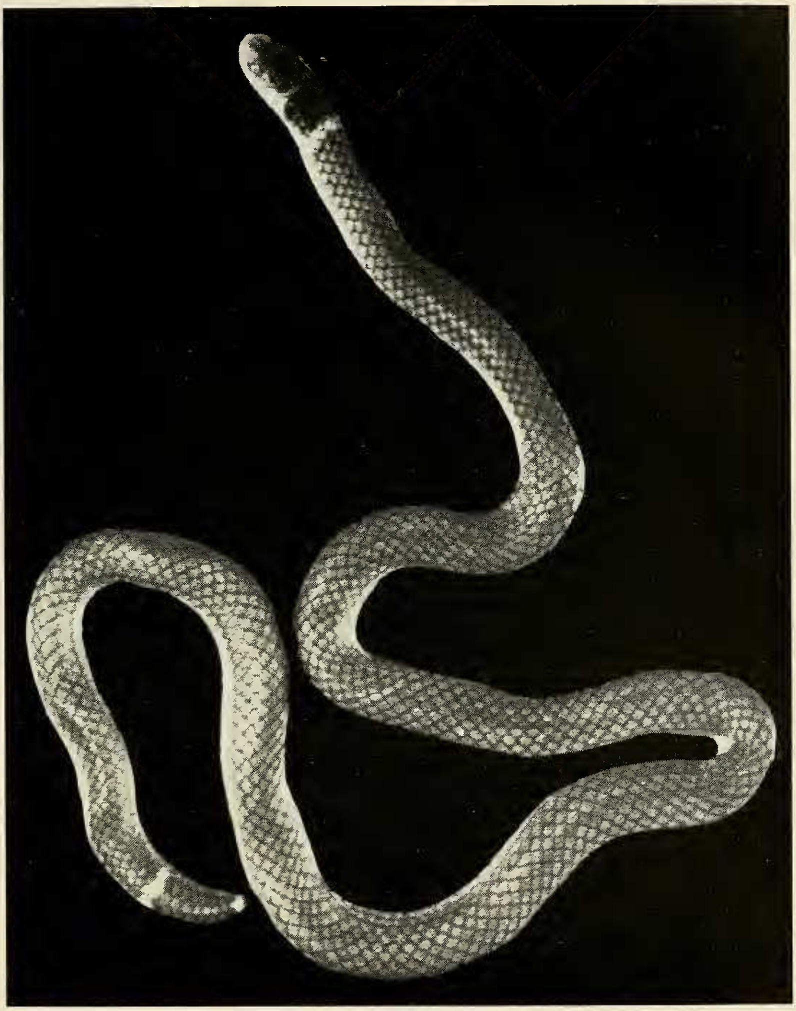

FIG. 47. *Calamaria siamensis* Günther. No. 36530, Doi Suthep, Chiang Mai, Chiang Mai province. Actual total length, 237 mm.; tail 9.5 mm.

pair; latter scales in contact for a very short distance, then separated by a scale.

Scale formula: 17 (occiput), 13, 13, 13. Scales smooth, lacking apical pits. Ventrals, 173; anal, single; subcaudals, 12, divided.

Color: Above dark brown, edges of scales darker than their centers; scale centers under magnification show numerous vermiculate white and brown marks; top of head dark blackish-olive; some cream-white marks on lower parts of supralabials; a deep black nuchal band with a yellowish mark placed both in front and behind it. Much dark pigment on infralabials with some cream-white marks; distinct yellow areas on sides of head. Ventrals ivory all with some brown pigment forming a bar on each scale, pigment stronger posteriorly; subcaudals similarly marked.

Measurements in mm.: Total length, 237; tail, 9.5; head-width, 4.1; head-length, 5.5; width of body, 4.2.

Remarks: It has been necessary to exhume this species name for this distinctive species occurring in the mountains of northern Thailand.

Measurements in mm. and Scale-counts of *Calamaria siamensis*

NUMBER	36530	36531	3176
Locality	Chiang Mai	Chiang Mai	Chiang Mai
Sex	♀	♀	♂
Total length	237	248	225
Tail	9.5	9.3	9.9
Head-width	4.1	4.1	4.1
Head length	6.3	6.3	6.3
Body-width	4.1	4	4
Preocular	1	1	1
Postocular	1	1	1
Supralabials	4	4	4
Infralabials	5	5	5
Ventrals	173	172	172
Subcaudals	12	11	13

In color and pattern the three are practically identical. The yellow band following the black nuchal band is less distinct in No. 36531. The preocular in all is narrow, and diagonally placed. There are three scales between the second chinshields and the first ventral; and three postparietals between the temporals.

Genus *Ahaetulla* Link

Ahaetulla Link, Beschr. Nat. Samml. Rostock, 1807, p. 73 (type of genus *fasciata* = *Coluber ahaetulla* Linnaeus *(part.)*.

Dendrophis Fitzinger, Neue Class. Rept., 1826, pp. 29, 30, Isis, 1827, p. 519, 520 (type, *Coluber ahaetulla*).

Dendrelaphis Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 339 (type, *caudolineatus*).

Tachyophis Mertens, Arch. Naturg. Berlin, vol. 3, 2, 1934, p. 189 (type *Coluber pictus;* name preoccupied, Rochebrune 1884).

Diagnosis: Maxillary teeth, 20-34, posterior ones smaller or scarcely larger than preceding teeth; head distinct, loreal region concave; scales smooth in 13 or 15 rows, outer row widened, others narrow, with apical pits, the transverse rows disposed obliquely; vertebral scales enlarged; ventrals with lateral keels on venter, the ventrals notched. Arboreal serpents.

There are five species of this genus in Thailand: *A. ahaetulla, cyanochloris, subocularis, formosa,* and *caudolineata.* They may be distinguished by the following key:

KEY TO THE THAI SPECIES OF AHAETULLA

1. Scales in 13 rows; black longitudinal lines on tail........... *caudolineata*
   Scales in 15 rows.. 2
2. A single elongate supralabial forming lower border of orbit; vertebrals feebly enlarged, narrower than scales of outer row; seven (or more rarely eight) supraoculars.................................... *subocularis*
   More than a single labial entering orbit........................... 3
3. Three or four, rarely two, postoculars present; eye large, as long as its distance from rostral; frontal as long as parietals; nine supralabials, three labials border orbit.. *formosa*
   Two postoculars; three labials border orbit; eye as long as its distance from nostril; vertebrals variable................................. 4
4. No stripes on flanks; vertebrals strongly enlarged, larger than outer scale-row; a broad temporal stripe extending on to neck and body...*cyanochloris*
   A yellow or cream stripe on first two scalerows, bordered above and below by a black line; vertebral scales not broader than outer scalerow, *ahaetulla ahaetulla*

These snakes all have a general similarity in appearance and all are excellent climbers.

The nomenclature of this genus has been in dispute for some time. I have accepted the opinion of Dr. J. Oliver* and Dr. Malcolm Smith that the name *Ahaetulla* applies to these Asiatic snakes, rather than to a South American species.

Ahaetulla caudolineata Gray

(Fig. 48)

Ahaetulla caudolineata Gray, Illustrations of Indian zoology, vol. 2, 1834, pl. 81 (type-locality not given).

Leptophis caudolineatus: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 932.

Dendrophis caudolineata: Günther, The reptiles of British India, 1864, p. 297.

Dendrelaphis caudolineatus: Boulenger, The fauna of British India, Ceylon and Burma . . . Reptilia and Batrachia, 1890, pp. 339-340; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 2, 1894, pp. 89-90; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 147; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1915, p. 213; Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 161 ("Patani"); de Rooij, The reptiles of the Indo-Australian Archipelago, vol.

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* Oliver, Bull. Amer. Mus. Nat. Hist., vol. 92, art. 4, 1948, pp. 167-190, 267-272; Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 241. Contrary opinion, Dr. Jay Savage, Bull. Chicago Acad. Sci., vol. 9, 1952, pp. 203-216.

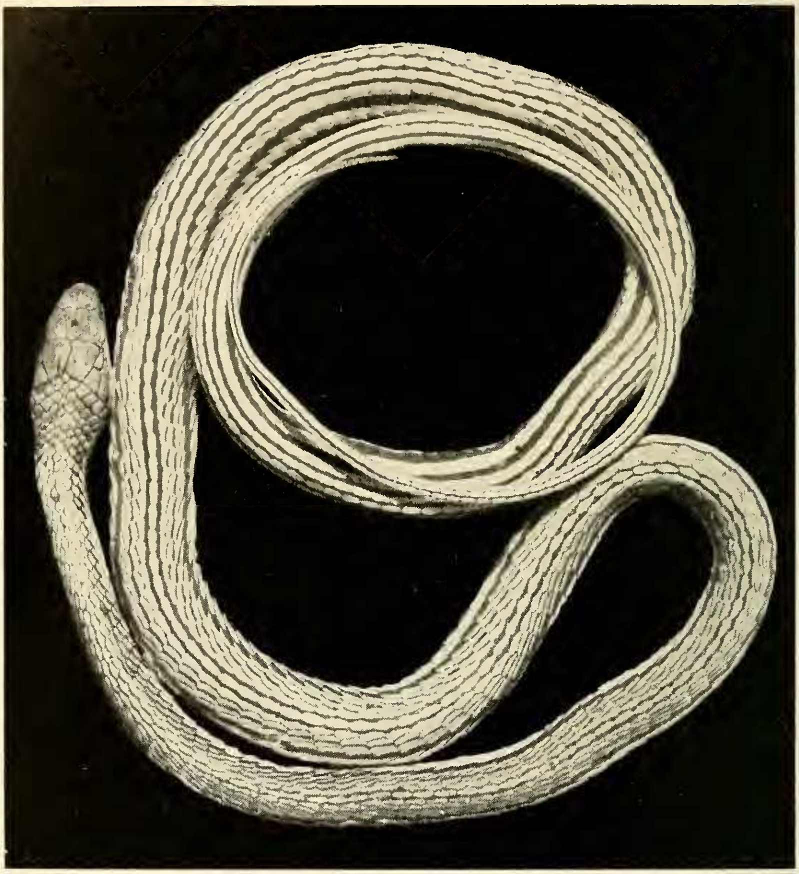

FIG. 48. *Ahaetulla caudolineata* Gray. No. 3478♀, Na Pradoo, Pattani province, southern Thailand. Actual total length, 1183 mm.

2, Ophidia, 1917, pp. 68-69, fig. 36; Sworder, Singapore Naturalist, no. 2, 1922, p. 64; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 52 ("Klong Wan, Tapli, Isthmus of Kra").

Ahaetulla caudolineata: M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 250; Tweedie, The snakes of Malaya, 1954, p. 55.

Diagnosis: Anterior maxillary and mandibular teeth longest. Head distinct from neck; scales in 13 rows disposed obliquely, with apical pits; scales except median and outer rows, elongate, narrow; ventrals with lateral keels.

Description of species (from No. 3478): Rostral once and a half wider than high, very narrowly visible above; internasals narrowed a little in front, about as wide as long; prefrontals broader than long; frontal longer than wide, the sides emarginate, as long as its distance from tip of snout, shorter than parietals; nasal completely divided; loreal two to three times as long as high; one preocular; supraocular nearly as wide as frontal; two postoculars; temporals, 2 + 2 + 2, anterior ones small, posterior largest; supralabials, 9-9, fifth and sixth bordering orbit; infralabials, 11-11, five anterior bordering first chinshields, which are wider but shorter than second pair; latter separated by scales.

Scalerow formula: 19 (occiput), 13, 11; scales smooth, anterior body scales with single apical pits; ventrals, 177, keeled and notched laterally; anal, divided; subcaudals, 103.

Color: Top of head brown-olive nearly uniform; supralabials greenish yellow with a little black coloration on posterior edges of third and fourth labials; chin and beginning of throat yellowish ivory; anteriorly greenish or greenish gray gradually developing green lines separated by coal-black lines bordering edges of dorsal and lateral scalerows; posteriorly the green gradually turns to greenish or yellowish ivory; a wider green stripe on edges of first and second scalerows bordered above and below by a black line, lower one near twice width of black upper border; five black lines and four yellowish lines on tail. Tail tapering gradually to a fine point. Venter nearly uniform grayish green; posterior edges of ventrals and subcaudals with an indistinct whitish line. A black median subcaudal line.

Measurements in mm. (Nos. 3478, 3917, Na Pradoo, Pattani): Total length, 1183, 1029; tail, 315, 265; width of head, 20, 18; length of head, 33, 27.

Variation: Ventrals vary between 171 and 188; subcaudals, 100 and 112. Boulenger reports a specimen measuring 1520 mm., the tail being 380 mm.

Distribution: In Thailand the species is known only in the peninsula. Specimens have been taken at Na Pradoo, Pattani, Narathiwat, and at Tapli near the Isthmus of Kra. It is a common snake in Southern India, Southern Burma, Malaya and the Indo-Australian Archipelago.

Remarks: The described specimen is from Na Pradoo, Pattani, collected by Nai Prayoon Kananuracks.

Ahaetulla subocularis (Boulenger)

(Fig. 49)

Dendrophis subocularis Boulenger, Ann. Mus. Civ. Sto. Nat., Genova, ser. 2, vol. 6, 1888, Aug. 22, p. 600, pl. 6, fig. 2 (type-locality, Bhamo, Upper Burma); Fauna of British India, Ceylon and Burma; Reptilia and Batrachia, 1890, p. 338.

Dendrelaphis subocularis: Boulenger, Catalogue of the snakes in the British Museum, vol. 2, 1894, p. 89; Smith, Journ. Bombay Nat. Hist. Soc., vol. 23, 1915, p. 785; Proc. Zool. Soc. London, 1921, p. 426; Gyldenstolpe, Kungl. Sv. Vet. Akad. Stockholm, vol. 55, 1916, (3) p. 15; Wall, Rec. Ind. Mus., vol. 22, 1921, p. 159; Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 625; *ibid.*, vol. 30, 1925, p. 813.

Dendrophis tristis subocularis: Meise and Henning, Zool. Anz., Leipzig, vol. 99, 1932, p. 292.

Ahaetulla subocularis: Smith, The Fauna of British India, Ceylon, and Burma; Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 249-250.

Diagnosis: Related to *Ahaetulla ahaetulla* but with the last three or four posterior maxillary teeth shorter and slenderer; no black stripe along edge of ventrals; anterior median series of scales with a row of white dots tending to form a continuous line; a yellow lateral line; vertebral scales scarcely enlarged; scalerows, 15; a single much elongated supralabial under eye.

Description of species (from No. 34972): Rostral wider than high, narrowly visible above; internasals about as long as broad, a little shorter than prefrontals but much smaller, suture between them about as long as that between prefrontals; latter much wider than long, touching loreal, and posterior part of nasal, laterally; frontal longer than its distance to tip of snout, shorter than parietals, its anterior width greater than that of supraocular; parietals touch only upper larger postocular; row of scales following parietals somewhat enlarged; nostril large, between two nasals; loreal elongate touching two labials; supralabials, 7-9 (on right side); five scales precede subocular on left side; only number three, the subocular, touches the two following supralabials; the one following subocular is excluded from temporals; one preocular, two postoculars; temporals, $2 + \frac{1}{2}$, $2 + 2 + 2$; mental much smaller than rostral; 10-11 infralabials, sixth much enlarged, five touching first chinshields, which are larger than second pair.

Scale-formula: 19, 15, 15, 11, median only slightly larger than adjoining rows and definitely smaller than outer row; lateral scales in somewhat oblique transverse rows; scales with single apical pits. Ventrals, 165, each with two keels; subcaudals, 101; anal, divided; 23 maxillary teeth, posterior ones smaller and slenderer than anterior.

Color in life: Head and anterior part of neck dark olive, gradually becoming bronze-brown, which color continues to end of tail, and laterally to middle of second scalerow. A cream or fawn stripe on edges of first and second scalerows below which is a very light bronzy line occupying outer half of row one and and edges of

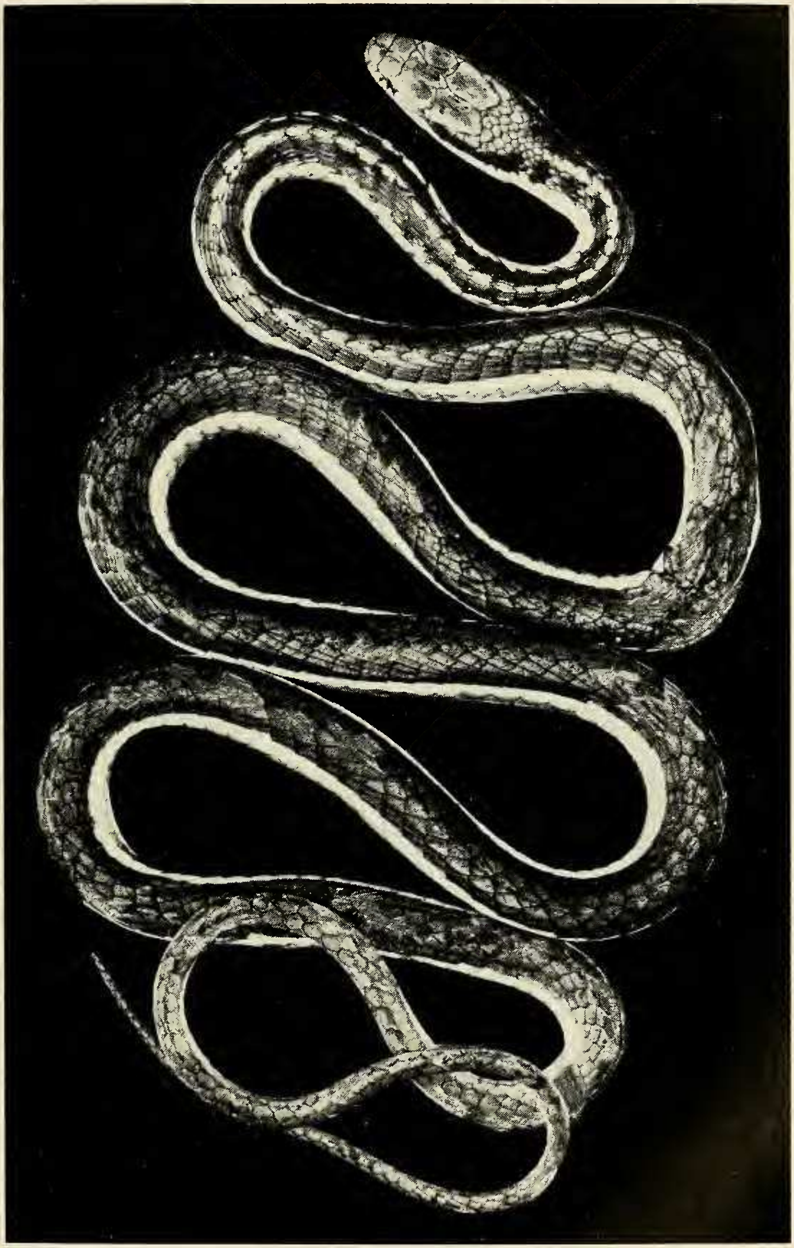

FIG. 49. *Ahaetulla subocularis* (Boulenger). No. 36140, Kaeng Pang Tao, Chiang Mai province. Actual total length, 880 mm.; tail, 234 mm.

ventrals; concealed parts of lateral scales light blue with blackish blotches at each end of blue area; these black spots are not entirely concealed so that diagonal scalerows are edged with a fine denticulate blackish line, less distinct or absent on latter half of body; an indistinct dark line behind eye quickly disappearing on neck; low on sides of neck the light stripe is bluish or dirty white; chin with a faint lavender wash; supra- and infralabials cream, the anterior ones with small black marks on sutures; chin, cream-white with a faint lavender wash.

Measurements in mm.: Length snout to vent, 454; tail, 175; total length 629; head-length, 18.2; head-width, 10.

Variation: Smith records the variation in ventrals as from 153 to 175; subcaudals, 85 to 105.

Remarks: The specimen when captured was crawling on the ground in cut over forest land, the new forest trees about 10-15 ft. high, were scattered. The figured specimen is from northern Chiang Mai province.

Ahaetulla formosa (Boie)

Dendrophis formosus Boie, Isis, 1827, p. 542, (type-locality Java); Flower, Proc. Zool. Soc. London, 1896, pp. 883-884; *ibid.*, 1899, p. 670; Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 2, 1894, pp. 84-85; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 146; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 64.

Ahaetulla formosa: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 52 (*part.*); Sworder, Singapore Nat., no. 2, 1922, p. 64; Tweedie, The snakes of Malaya, 1954, pp. 54-55, pl. 3, upper fig.

Diagnosis: Eye large, equal to its distance from front of nostril; internasals a little longer than prefrontals; frontal as long as parietals; one preocular, two to four, usually three postoculars; temporals, 2 + 2; usually three supralabials bordering orbit; scales in 15 rows; vertebrals considerably larger than scales of outer row; olive, brown, or bronze-brown with reddish and greenish shades; scales edged with black; a black stripe on sides of head, passing through eye, extending on to neck where it widens and converges toward its fellow; two black lines may be present on posterior part of body; venter greenish.

Description of species (from Boulenger, 1912). Eye very large; rostral twice as broad as deep, well visible above; internasals smaller but as long as prefrontals; frontal as long as its distance from end of snout and as long as parietals; loreal much longer than high;

one preocular, and two to four (usually three) postoculars; temporals, 2 + 2; normally nine, rarely eight supralabials, fifth and sixth enter orbit (rarely fourth also); five infralabials touching anterior chinshields which are much shorter than posterior; scales in 15 rows, those of vertebral row considerably larger than those of outer row; ventrals, 174-205; anal, divided; subcaudals, 132-158.

Color: Olive, bronze-brown, or yellowish brown above, with red and green shades; scales edged with black; neck, and sometimes head, red-brown; a black stripe on each side of head passing through eye and extending onto nape, where it widens considerably and converges toward mid-line of neck; two black lines may be present along each side of posterior part of body; upper lip greenish yellow; lower parts greenish.

Measurements in mm.: Total length (largest specimen), 1420; tail, 480.

Distribution: In Thailand this species is confined to the southern peninsular area, specimens having been taken in the provinces Narathiwat, and Yala. Elsewhere the species is present throughout Malaya, and in the islands of Borneo, Sumatra, and Java.

Ahaetulla cyanochloris (Wall)

Dendrophis pictus var. *cyanochloris* Wall, Rec. Ind. Mus., vol. 22, p. 155 (type-locality, Mergui, Tenasserim, Burma).

?*Dendrophis formosus:* M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 2, Dec. 1916, p. 161 (see M. Smith, 1943, p. 244-245).

Ahaetulla cyanochloris: M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 482. The fauna of British India . . . Reptilia and Amphibia, vol. 3, serpentes, Dec. 1943, pp. 244-245.

Ahaetulla formosa: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 52 (*part.*). ("Bangnara" = [Narathiwat] and Benang Stah).

Dendrophis pictus: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 337 (*part.*); Catalogue of the snakes of the British Museum, 2nd Ed., vol. 2, 1894, pp. 78-79 (*part. fide* M. Smith).

Diagnosis: A slender arboreal snake, feeding chiefly on the ground. Maxillary teeth, 21-24, teeth increasing in size posteriorly; internasals shorter, or nearly as long as prefrontals; three supralabials bordering orbit, fourth very slightly so or just failing to touch edge of orbit; vertebrals at middle of body wider than scales of outer scalerow. Scales in 15 rows reducing to nine posteriorly. Two anals. A broad temporal stripe extending onto neck where it may break up into spots.

Description of species (data from Wall (1921) and M. Smith 1943): Head moderately separated from neck. Snout a little broader and more truncate than in *ahaetulla;* eye as long as its distance from middle or front end of nostril; internasals as long as or a little longer than prefrontals; temporals, 1 + 1, or 2 + 2; normally nine, rarely eight or ten supralabials, fourth touching edge of orbit, fifth and sixth bordering orbit; vertebral scales strongly enlarged and at middle broader than scales of outer row, their posterior margins truncate or concave.

Scale-formula: 15, 15, 11 (or 9). Ventrals, 186-211; subcaudals, 135-159; anal divided.

Color in life: Bronze-olive above, scales black-edged; ventrals and outer scalerows pale greenish or yellowish; usually no black stripe on flank; broad black temporal stripe extending onto neck and forepart of body, where it may break into spots; lips and lower jaws yellowish.

Measurements in mm.: (largest), 1330; tail, 405.

Distribution: In Thailand the species occurs in the northwestern part. Outside Thailand it ranges in Bengal, Assam, Upper Burma, Tenasserim, Indo-China and the Andaman and Nicobar Islands.

Remarks: This species, said to very similar in appearance to *ahaetulla ahaetulla,* has fewer maxillary teeth; there is a slight difference in squamation, the width of the middorsal row is greater, the details of the lateral markings are different, and the internasals are longer than the prefrontals. I have not seen a Thai specimen of this species.

Ahaetulla ahaetulla (Linnaeus)

Three subspecies of this widespread form are recognized, but as yet only a single form has been taken in Thailand.

Ahaetulla ahaetulla ahaetulla (Linnaeus)

(Fig. 50)

Coluber ahaetulla Linnaeus, Systema naturae, 10 Ed., 1758, p. 225 (*part.*) (type-locality, unknown); Andersson, Bihang Till K. Sven. Vet. Akad. Stockholm, Band. 24, Afd. 4, 1899, p. 22.

Coluber pictus Gmelin, Systema naturae, Ed. 12, vol. 1, 1789, p. 1116 (type-locality, not given).

Dendrophis pictus: Boie, Isis, 1827, p. 530 (Java); Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 337-338; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 2, 1894, pp. 78-79 (*part.*); de Rooij, The snakes of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 58-60, fig. 34; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1907; p. 189; *ibid.,* vol. 19, 1909-1910, pp. 347, 788; *ibid.,* 25, 1918, p. 509; Rec. Ind. Mus., vol. 22, 1921, p. 153; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914-1915, p. 86, 176, 187, 213; Sworder, Singapore Nat. no. 2, 1922, p. 64; M. Smith, Journ. Federated States Mus., vol. 10, 1922, p. 266; Bull. Raffles Mus., no. 3, 1930, p. 51-52; Meise and Hennig, Zool. Anz., Band, 99, Heft, 11/12, 1932, p. 287; Shaw, Shebbeare and Baxter, Journ. Bengal Nat. Hist. Soc., vol. 14, 1940, p. 108.

Ahaetulla fasciata Link, Beschr. Nat. Samml. Rostock, 1807, p. 74 (based on figure in Bechstein).

Coluber decorus Shaw, General zoology, vol. 3, 1802, p. 538, (type-locality not known).

Ahaetulla bellii Gray, Illustrations of Indian Zoology, vol. 2, 1834, pl. 80, fig. 2 (type-locality, Singapore).

Dendrophis picta andamanensis Anderson, Proc. Zool Soc. London, 1871, p. 184 (type-locality, Andaman Islands).

Dendrophis proarchus Wall, Journ. Bombay Nat. Hist. Soc. vol. 19, 1909-10, pp. 347, 827 fig. (type-locality, Dibrugarh, Assam.).

Ahaetulla boiga: Cochran, Proc. U. S. Nat. Mus., vol. 77, pt. 2, p. 26; (no such species described by Lacépède [see Pope, next entry also], Smith, 1943, p. 241).

Dendrophis boiga: Pope, The reptiles of China . . . 1935, pp. 279-281.

Dendrophis pictus ngansonensis Bourret, Bull. Gen. Instr. Pub. Hanoi, May, 1935, p. 4 (type-locality Ngan-son, Tong-King); Les serpents de l'Indo-Chine, vol. 2, 1936, p. 221.

Ahaetulla picta: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 51.

Ahaetulla ahaetulla ahaetulla: M. Smith, The fauna of British Indian Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 242-244, figs. 10A., 85. Taylor and Elbel Univ. Kansas Sci. Bull., vol. 38, pt. 2, Mar. 20, 1958, p. 1142 (Nakhon Sawan, Thailand).

Ahaetulla ahaetulla: Tweedie, The snakes of Malaya, 1954, p. 54 text fig. l. h.

Diagnosis: Maxillary teeth, 23-28 increasing in length posteriorly. Eye as long as its distance from nostril; internasals shorter than prefrontals; fourth, fifth, and sixth supralabials touch or border orbit; vertebral scales at mid-body not wider than scales of outer row; scales in 15 rows reducing to nine or eleven rows just before vent; a ventrolateral cream or yellowish line bordered by black, which may extend entire length of body.

Description of species (from No. 2, Doi Suthep, Chiang Mai, circa 100 m. elev.): Head slightly distinct from neck; rostral one-and-one-fifth times as wide as high, well visible above; prefrontals large, a little wider than long, smaller and not as long as prefrontals; latter scales one-and-one-half times as wide as long, their suture with loreal and preocular subequal; frontal somewhat bell-shaped, wider than supraoculars, touching preoculars, longer than its distance to end of snout, slightly shorter than parietals; nasal single; loreal more than twice as long as wide; preocular single; two postoculars (three on right, one probably a segment from the fifth labial); temporals, 1 + 1 + 2 (2 + 1 + 2); supralabials, 8-9 third, fourth, and fifth (fourth, fifth, and sixth) bordering orbit; eye large, its length equal to its distance from front of nostril; infralabials, 10-10, five touching anterior chinshields which are shorter than posterior; latter in contact with one another for half their length.

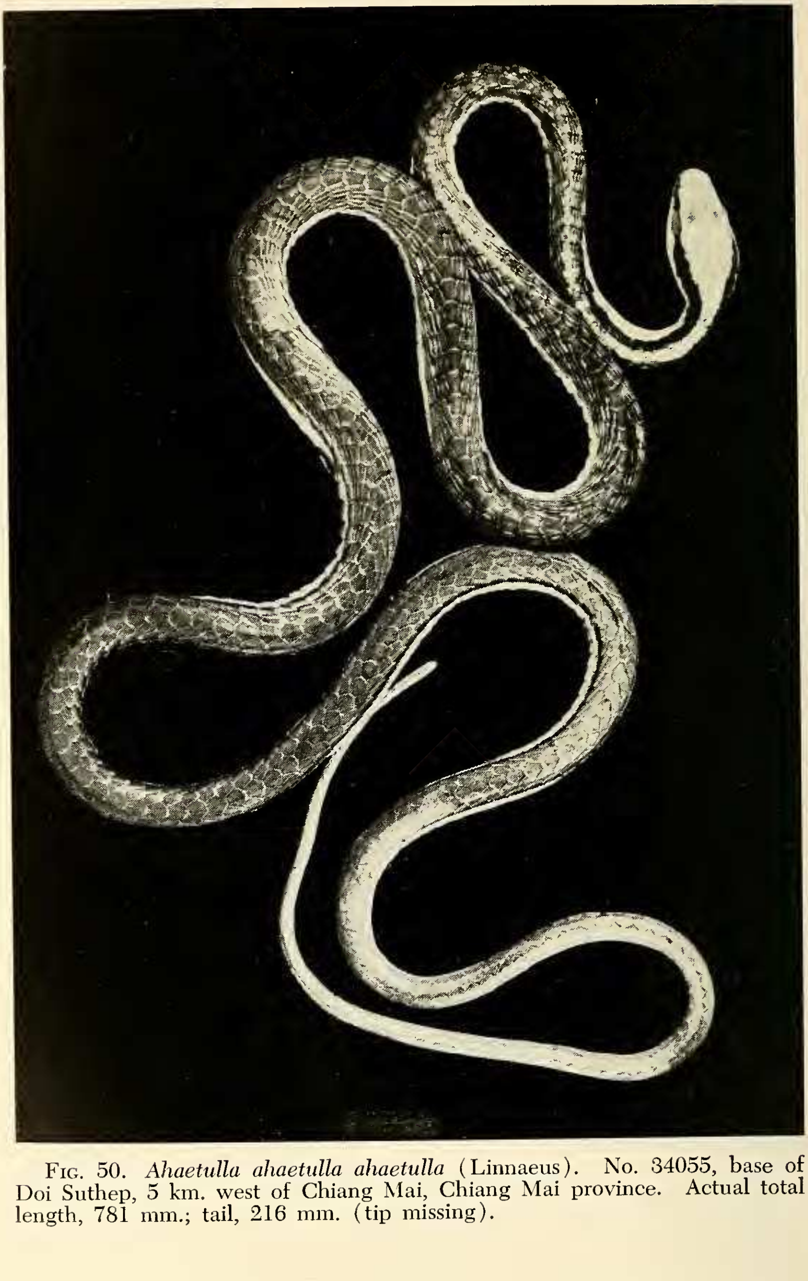

FIG. 50. *Ahaetulla ahaetulla ahaetulla* (Linnaeus). No. 34055, base of Doi Suthep, 5 km. west of Chiang Mai, Chiang Mai province. Actual total length, 781 mm.; tail, 216 mm. (tip missing).

Scalerows: 22 (occiput), 15, 15, 9; scales rather strongly striate, with a single apical pit. Ventrals, 175, keeled on each side and notched at keel; two anals; subcaudals, 143, last three or four likewise keeled and notched. There are 26-25 maxillary teeth, becoming considerably enlarged posteriorly.

Color: Olive-bronze with a black stripe from eye, widening on occiput and passing back along sides of neck where it tends to break up and disappear. Chin and labials cream-white; top of head a lighter bronze-brown than body; a somewhat darker line on sides of snout; sides of body with a diagonal series of dark marks alternating with similar series of scales each with a bluish white mark, most evident on anterior third of body, tending to disappear posteriorly; a light stripe low on sides bordered above and below by a dark stripe. (In preserved specimens the light stripe may be partially obscured, and posterior edges of ventrals appear white).

Measurements in mm.: Snout to vent, 463; tail, 243; total length, 706; width of head 9.2; length of head 18.

Variation: Two other specimens from Thailand are at hand:

No. 689 ♂ Khao Chong, Trang, has 28-29 maxillary teeth; scales reducing to eleven rows posteriorly. Ventrals, 172, subcaudals, 127 + ; anals, 2.

No. 688 ♀ has 25-25 maxillary teeth; ventrals, 180; subcaudals 138; anals, 2. Locality probably Bangkok. This specimen contains six eggs. The scales bear numerous fine striations over most of their surface. (The character of the striae vary, since on the northern specimen the striae are coarser and somewhat fewer in number). The width of the median row of scales varies somewhat in the same specimen. The color characters are important but these tend to disappear in preservatives.

This is not an uncommon snake, however its speed of movement in bushes and trees makes it somewhat difficult to capture. It feeds almost wholly on frogs which it obtains for the most part on the ground. Then it seemingly again returns to shrubs and trees for hiding. Most examples are encountered near water, and especially near rice fields.

The species is oviparous, three to six eggs being laid at one time. Smith (1943) remarks that development of the embryo may begin before deposition. De Rooij (1917) states that they are ovoviviparous. This, probably, is a *lapsus* for oviparous.

Distribution: The species occurs over Thailand in suitable localities and probably could be found in every province. It is also present in India, Burma, Indo-China, Malaya, the Indo-Australian Archipelago, as far east as the Philippines.

Subfamily NATRICINAE

Genus *Natrix* Laurenti

Natrix Laurenti, Synopsis reptilium, 1768, p. 73 (type of genus, *Natrix vulgaris* = *Coluber natrix* Linnaeus).

The genus *Natrix* has long been regarded as being something of a puzzle, largely because of the diversity of the forms that have been included in it. As understood by many herpetologists it is a composite group consisting of more than a single genus. In my study of Thai species I have been convinced of the wisdom of accepting Fitzinger's genus *Rhabdophis* for natricine snakes with large ungrooved back fangs formerly placed by many herpetologists in *Natrix*. I believe all the American species now considered in this genus are ovoviviparous. At least many of the southeastern Asiatic forms are oviparous.

Malcolm Smith (1943) has declared a relationship between several small Asiatic species and *Natrix modesta,* synonymizing with it certain ones and suggesting that others should perhaps be so regarded. I do not regard this arrangement as acceptable; I also doubt that the group is generically separable from *Natrix* as has been proposed.

Diagnosis: Maxillary teeth, 22-28 (*piscator*); 28-34; posterior teeth gradually enlarged; scalerows, 15 or 19 without nuchal groove or nuchal glands; internasals truncate (*piscator*) or much narrowed anteriorly.

KEY TO SPECIES OF THAI *Natrix*

1. Nostrils lateral; anterior part of internasal a little more than half width of scale, broadly truncate; more than thirty maxillary teeth............ 2

Nostrils directed upwards; internasals narrowed anteriorly to about one-third width of the scale; less than thirty maxillary teeth............... 6

2. Fourth, and fifth supralabials bordering orbit; usually in adults dark reticulations or dark cross-bars enclosing light spots, venter yellow, *percarinata*

Fourth, fifth and sixth supralabials bordering orbit.................. 3

3. Strong lateral dark spots or bars, usually triangular, the points usually crossing ventrals; a dorsolateral series of light spots may be present, the marks fading with age..............................*trianguligera*

Not so marked.. 4

4. Venter with three series of quadrangular dark or black spots forming lines..*deschauenseei*

Not so marked.. 5

5. Black above with a dorsolateral chain of yellow spots; two outer scalerows with yellow centers; outer edges of ventrals and subcaudals with black spots; ventrals, 147-154, subcaudals, 120-126; anal single....*groundwateri*

Indefinite gray to brown reticulation with two very narrow light dorsolateral cream lines; labials cream, the color continued as a line diagonally on neck and joining dorsolateral lines; venter yellow, the ventrals with an outer gray or blackish spot . . . . *inas*

6. Venter yellowish or ivory; outer posterior edge of ventrals grayish or sometimes blackish; diagonal lines from eye absent or very dim; no black diagonal lateral stripe on neck tending to meet its fellow on nape, *piscator*

Each ventral scale with a well-defined complete transverse stripe; two strong diagonal lines from eye, and a lateral nuchal black line, *flavipunctata**

Natrix percarinata Boulenger

Tropidonotus percarinatus Boulenger, Proc. Zool. Soc. London, 1899, pp. 163-164 (type-locality, Kuatun Mts., 3000-4000 ft., NW Fokien, China).

Natrix percarinata: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, p. 201 (Hainan); Rec. Ind. Mus., vol. 42, 1940, p. 483; Parker, Ann. Mag. Nat. Hist., ser. 9, vol. 15, 1925, pp. 302, 304; Pope, The Reptiles of China, 1935, pp. 116-120, pl. 6, figs. F and G; Stejneger Proc. U. S. Nat. Mus., vol. 66, 1925, p. 71 (Szechwan); M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 299. (Southern China, Upper Burma, North Siam [Doi Suthep], Hainan, Tong-King, Annam, and Formosa.)

Natrix annularis: Barbour, Mem. Mus. Comp. Zool., Harvard Coll., vol. 40, 1912, p. 130 (Ichang) (not of Hallowell).

Natrix aequifasciata: Chang, Contr. Biol. Lab. Sci. Soc. China (Zool. Ser.), vol. 8, 1932, p. 33 (not of Barbour).

Diagnosis: Maxillary teeth, 30 to 34. Posterior maxillary teeth gradually enlarged; internasals narrowed anteriorly; nostrils directed slightly upwards; scales in 19 rows, keeled; two anterior temporals; two labials border eye.

Description of species: Rostral twice as broad as high, barely visible above; internasals much longer than broad, narrowed anteriorly, longer than prefrontals; frontal one-and-three-fifths times as long as broad, as long as its distance from end of snout, a little shorter than parietals. Nasal completely divided; loreal as high as wide; one preocular, three postoculars, and a small subocular; temporals, 2 + 3; eight supralabials, fourth and fifth bordering orbit; five infralabials touching anterior chinshields which are shorter than posterior.

Scales in 19 rows; ventrals, 141; anal, divided; subcaudals, 71, paired.

Color: Grayish olive above, sides with light-edged black vertical bars; four anterior supralabials grayish olive as is upper surface of head. Rest of head yellowish white like lower surface; venter uniform yellowish white anteriorly, spotted and speckled with black posteriorly; subcaudal area dark gray with some black spots.

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* While I am unable to accept Dr. Malcolm Smith's arrangement of *flavipunctata* as a subspecies of *piscator*, I have followed him in using Hallowell's name for the common variable form occuring throughout Thailand. The type of *flavipunctata* was a rather small specimen, something over 22 inches in length. Hallowell states: "Head small eye somewhat prominent" "eight supralabials the eye resting on the third and fourth." He fails to describe the color and markings of the body save to state "Color dusky yellow with numerous yellow spots along the margins of the scales." "Under parts yellow, the posterior margin of each scute bordered with black."

Measurements in mm.: Total length, 500; tail, 130.

Variation: Maxillary teeth vary between 30 and 34, the ventrals from 133 to 157; subcaudals 68 to 85. Temporals may be 3 + 3. The scales are strongly keeled, the outer row may or may not be smooth. The young are dark olive green or gray, the color descending on sides as v-shaped bars, often forming complete bands; area between bars yellowish.

Distribution: The species has as yet been taken only in Chiang Mai province on Doi Suthep. It is widely distributed from Burma through Southern China to Hainan and Formosa. One would expect to find the species in all the northwestern provinces.

Remarks: The species reaches a length of 940 mm.; the tail, 270 mm. The species is reported sometimes as brooding the eggs.

Natrix trianguligera (Boie)

(Fig. 51)

Tropidonotus trianguligerus Boie, Isis, 1827, p. 535 (type-locality, Java); Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 224; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 125; Wall, Journ. Bombay Nat. Hist. Soc., vol. 31, 1926, p. 560; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 2, Dec. 1915, p. 159 (Khoa Wang Hip, Nakhon Si Thammarat; Klong Bang Lai, "Patiyu").

Natrix trianguligera: Smith, Bull. Raffles Mus., no. 3, 1930, p. 43; Barbour, Mem. Mus. Comp. Zool. Harvard Coll., vol. 44, 1912, p. 108; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 84; Sworder, Singapore Nat., 1922, pl. 61; Tweedie, The snakes of Malaya, 1954, p. 68, fig. 15 d.

Diagnosis: Internasals narrowed and truncate anteriorly; nasal divided completely or almost so; one preocular, three postoculars; temporals, 2 + 3; nine supralabials, fourth, fifth, and sixth entering orbit; scales in 19 rows. A broad olive to olive-brown median stripe, spotted or reticulated with gray-black; sides reddish with triangular or subquadrangular spots, the apices on ventrals; venter cream (reddish in life).

Description of species (from No. 20285, Boonsong Lekagul collection): Head distinct from neck; rostral about twice as broad as high; internasals longer than broad, narrowed anteriorly and truncate, the suture between them longer than that between prefrontals; latter broader than long; frontal truncate anteriorly its sides slightly concave, its length greater than its distance to tip of snout, shorter

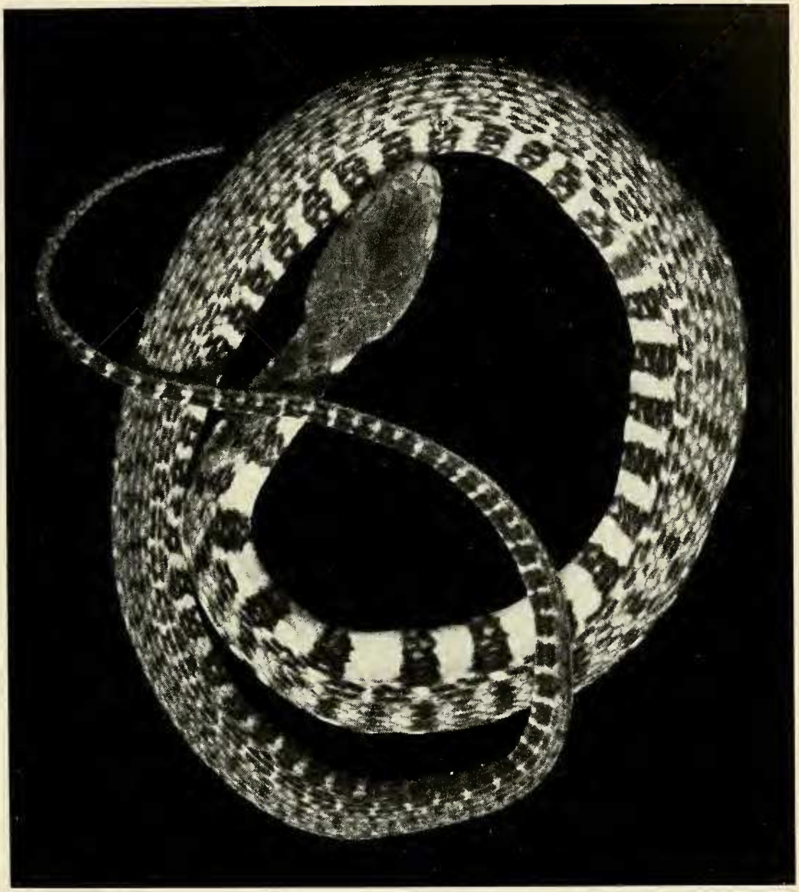

FIG. 51. *Natrix trianguligera* (Boie). P.K. 108, Na Pradoo, Pattani province, southern Thailand. Actual total length, 351 mm.; tail, 110 mm.

than parietals; nasals seemingly completely divided, anterior part largest; loreal approximately as high as long, or a little higher; the single preocular reaches top of head but separated from frontal; three postoculars, upper largest; temporals, 2 + 3; supralabials, 9-9, fourth, fifth, and sixth border orbit; diameter of eye approximately as long as snout; infralabials, 10-10, first five touch first chinshields which are shorter than second pair; latter separated by one or two scales. Scale formula: 21 (occiput), 19, 19, 17; scales strongly keeled except outer row which is usually smooth; ventrals, 138; anal, divided; subcaudals, 88.

Maxillary teeth, 32, last three or four gradually but slightly enlarged.

Color: Head and median part of back (seven or eight scalerows) dark-olive with a tiny pair of black spots on parietals; on back numerous black flecks or spots posteriorly becoming a dim reticulation; sides reddish (faded), with series of vertical black triangles, the apices on ventrals, and each spot showing one or more small light flecks; intervening ground color much wider than triangles anteriorly, but posteriorly they become equal and even smaller; triangles, as they reach ventrals, usually send out processes which may or may not cross ventrals; venter probably reddish (faded to cream); on tail lateral triangular spots almost joined together on underside of tail; labials with black sutures.

Measurements in mm. (Largest known): Total length, 1200; tail, 340.

Variation: The ventrals vary between 134-145, the subcaudals between 86 and 96.

Two young specimens are at hand. These are No. 35586, which I collected at Tonka Harbor Tin Mine, Ronpibon, Nakhon Si Thammarat; and P.K. No. 108 from Na Pradoo, Pattani province collected by Nai Prayoon Kananuraks.

The first specimen (35586) has 43 lateral black spots on the body, 134 ventrals, two anals and 89 subcaudals. The second has 44 lateral black spots, 136 ventrals, two anals and 95 subcaudals. Four is the usual number of postoculars, but the first specimen has only two on the right side. The lateral spots on this specimen are generally triangular but in the second they are nearly quadrangular and from the lower edge of each are two narrow taillike projections that extend onto the ventrals or cross the venter. On the tail the intervening light marks are very narrow and become obsolete toward the tip of the tail.

The second specimen (No. 108) of *Natrix trianguligerus,* from Na Pradoo, varies in certain other characters from the described specimen. The head is moderately slender; the rostral is at least 1½ times wider than high and is visible above as a line. The internasals are narrowed anteriorly and are longer than wide, while the prefrontals are broader then long, their mutual suture shorter than that between the internasals. The frontal is longer than wide, greater than its distance to the tip of the snout, but shorter than the parietals; the supraocular is only slightly less wide than the frontal. The nasal is almost or completely divided, the nostril chiefly in the anterior part. The loreal is higher than long, the preocular preceding it rather large, reaching the upper surface of snout. Four postoculars are present, the upper largest, touching the parietal. The temporal formula is 2 + 2. There are 9-9 supralabials, the 4th, 5th, and 6th enter the eye, the 8th largest. The diameter of the eye is three-fourths of the length of the snout. The mental is not as wide as the rostral. The infralabials are 9-9, five touching the first chinshields, that are distinctly shorter than the second pair which touch only anteriorly. One pair of scales is present between the second pair of chinshields and the first ventral. The scale-formula: 23 (occiput), 19, 17, 17, all rows keeled except the outer.

Distribution: The species is known from Pattani peninsular Thailand, and it has also been reported from Nakhon Si Thammarat by Malcoln Smith. The specimen here described is from near Ranong, Ranong province at the Isthmus of Kra. The species occurs also in Burma, Malaya, and the Indo-Australian Archipelago.

Natrix deschauenseei Taylor

(Fig. 52)

Natrix deschauenseei Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, pp. 300-302, plate 17, fig. 5, text figs. 2, 3, 4 (type-locality, Chiang Mai, North Thailand).

Natrix modesta: Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 291-292, (*part.*).

Diagnosis: Maxillary teeth, 36, the posterior three or four enlarged but not abruptly so; eight supralabials; scales in 19 rows. Dorsal scalerows, except outer two or three, keeled. Venter with three rows of gray spots.

Description of species (from No. 5, Doi Suthep, Chiang Mai, topotype): Head distinct from neck; rostral a little less than twice as wide as high, narrowly visible from above, truncate posteriorly; internasals narrowed, truncate anteriorly, their length equal or slightly less than that of prefrontals; latter about one fourth wider than long, the longest lateral suture with loreal; frontal shorter than its distance from tip of snout, distinctly shorter than parietals; latter scales distinctly shorter than wide; nostril in a single nasal that shows a partial division below nostril; loreal large, considerably longer than high; two preoculars, upper largest, and two postoculars, parietal touching the upper, the first temporal touching both; temporals, 5 + 2 + 3; supralabials, nine, fifth and sixth border orbit; infralabials, nine, five touching anterior chinshields which are equally as large as posterior; scales keeled except on three outer rows anteriorly, and two outer rows posteriorly.

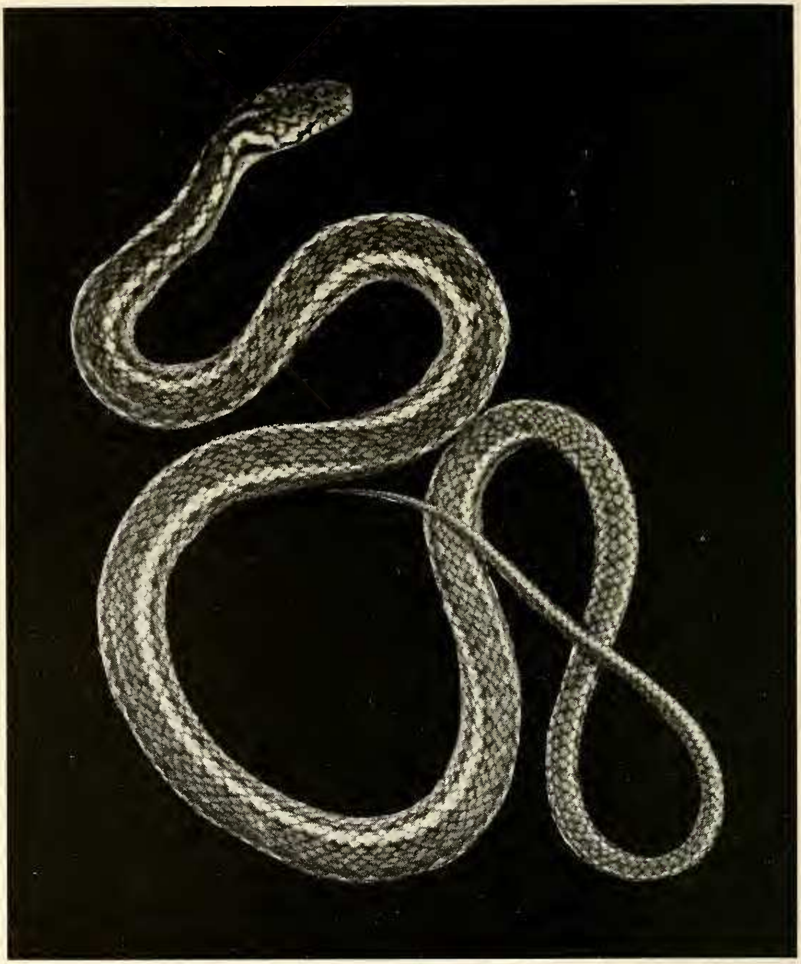

FIG. 52. *Natrix deschauenseei* Taylor. No. 35952, Doi Suthep, Chiang Mai province. About actual size.

Scale-formula: 23 (on occiput), 21 at fourth ventral, 19 at middle of body, 17 on latter part of body; apical pits absent (at least I discern none); ventrals, 159, that preceding the divided anal scale is also divided; subcaudals, 140.

Color in life: Brownish gray, anteriorly with two lighter dorsolateral series of dots or X-shaped spots, separated by ground color, and which farther back form a more or less continuous lighter line covering parts of three scalerows on body, only one on tail; between light lines five median rows have series of very indefinite dark spots or flecks that may be dimly joined on back but not visible on tail; scales of four outer scalerows with light centers and dark edges; ventrals edged in black making a fine continuous line bordered by a white line. Venter with three rows of brownish gray spots, the median beginning at about eleventh ventral, lateral ones somewhat farther back. As vent is approached, spots cover most of venter; on latter half of body there is a peppering of pigment between spots; subcaudals brownish, scale-edges lighter; outer edge of subcaudals with a continuous light line.

Head variegated brown with indefinite blackish flecks and lines; supralabials light with darker edges, especially the suture between sixth and seventh; a dark line begins behind eye, curves down across eighth and ninth labials with a lighter line above it which joins the dorsolateral line. Chin, throat, and infralabials cream, latter scales with blackish sutures.

Measurement and data on *Natrix deschauenseei*

NUMBER	5	67	68
Total length	480	363	290
Tail	172	124	101
Head width	8	8	6.5
Head length	14	12	11
Supralabials	9	9–9	9–10
Infralabials	9–9	10–10	9–9
Labials entering eye	5, 6	5, 6	5, 6 (5, 6, 7)
Preoculars	2	2	2
Postoculars	2	2	2
Temporals	1+2+3	1+2+3	1+2+3
Ventrals	159	....	....
Subcaudals	140	....	....

Distribution: Known from type-locality only.

Natrix groundwateri M. Smith

(Fig. 53)

Natrix groundwateri M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 4, no. 4, 1921, pp. 205-206, pl. 8, fig. 2, (type-locality, Tasan 40 km. S. W. Chumphon, ?Ranong province, Thailand); M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, p. 291.

Diagnosis: Small slender *Natrix;* 19 scalerows anteriorly, reducing to 17 at middle of body; scales smooth anteriorly, feebly keeled posteriorly; ventrals, 147-151; subcaudals, 120-126; supralabials, nine, the fourth, fifth, and sixth entering orbit.

Description of species (after M. Smith): Rostral much broader than deep; internasals narrowed anteriorly, as long as prefrontals; frontal one and one-fourth times as long as broad, as long as its distance from end of snout, much shorter than parietals; loreal twice as long as high; two preoculars; two or three postoculars; temporals, 1 + 2; nine supralabials, fourth to sixth touching eye; five infralabials in contact with anterior chinshields which are as long as posterior.

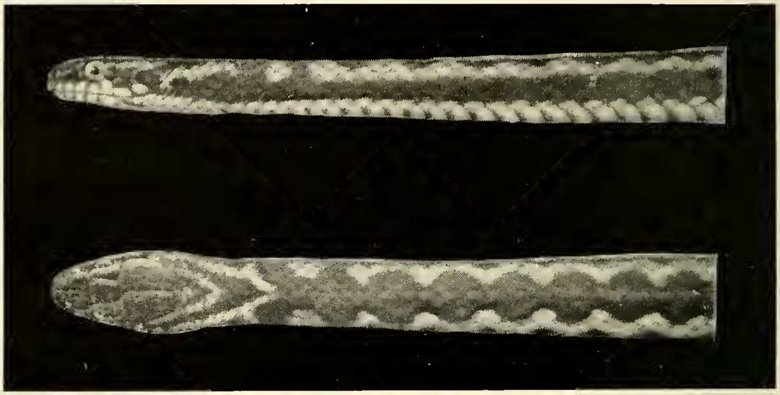

FIG. 53. *Natrix groundwateri* M. Smith. From M. Smith, Journ. Nat. Hist., vol. 4, 1922, pl. 8, fig. 2.

Maxillary teeth 30, last not abruptly enlarged.

Scales in 19 rows anteriorly reducing to 17 at mid-body, and so continued to vent, smooth anteriorly, feebly keeled posteriorly. Ventrals, 147; anal, single; subcaudals, 120, divided.

Color: Black above with a dorsolateral chain of yellow spots connected by a festooned stripe; two outer rows of scales with yellow centers; labials yellow with black sutures, and a yellow streak from angle of mouth to nape; a v-shaped mark behind occiput. Below yellowish, with a black spot at outer edge of each ventral and subcaudal shield.

Measurements in mm.: Total length, 450; tail, 165.

Variation: Four other juvenile specimens taken in the same locality show practically no variation from the type-specimen except in the number of the ventral and caudal scales and in the color of the head which is light brown above, with yellow vermiculations. Ventrals vary between 147 and 151; subcaudals, 120 and 126.

Distribution: Known only from the type locality.

Natrix inas (Laidlaw)

(Fig. 54)

Tropidonotus inas Laidlaw, Proc. Zool. Soc. London, 1901, vol. 2, p. 576, pl. 35, figs. 3 and 4 (type-locality, Gunong Inas, Perak, Malaya); Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 125; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 159.

Natrix modesta: (*part.*) M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 290-291.

Natrix inas: M. Smith, Bull. Raffles, Mus., no. 3, Apr. 1930, p. 43 (Nakhon Si Thammarat Mts.); Tweedie, The snakes of Malaya, 1954, pp. 70-71, fig. 17, a, b.

Diagnosis: A slender snake. Ventrals, 143 to 151, subcaudals, 93 to 109. Ventrals with quadrangular dark spots on ends; ventral surface cream-white. Labials with a cream line turning up on sides of neck and continuing dorsolaterally as a series of small indefinite cream spots or as a dim light line. Two or three labials border orbit.

Description of species (from No. 34152): Rostral stands nearly vertical, twice as wide as high, visible above as a black line: Internasals about as wide as long, narrowing anteriorly; prefrontals wider than long, touching loreal, nasal, and preocular, latter forming the longest suture; frontal distinctly longer than wide, six-sided, a little wider anteriorly than posteriorly, longer than its distance from tip of snout, distinctly shorter than parietals; nasal divided, posterior part the larger, touching two supralabials; loreal nearly quadrangular; preocular elongate reaching top of head but not touching frontal; supraocular little more than half width of frontal and somewhat shorter; three postoculars upper largest; anterior temporals, two, the upper a tiny scale; temporals, 2 + 1 + 2; a series of six scales border parietals behind, the two median scales occupy space in a deep median emargination of the parietals; parietals much narrowed posteriorly; supralabials, nine-nine, fourth, fifth, and sixth border orbit, eighth largest (as if a secondary temporal had been fused to it): infralabials ten, last smallest, first five border first chinshields which are wider but shorter than the slender, posteriorly pointed, second pair; latter separated by a row of three small scales followed by a pair of scales. Eye large, its diameter equal to its distance from nostril.

Scalerow-formula: 23 (occiput), 19, 19, 17; anteriorly at least eight scalerows dimly keeled, posteriorly 15 or 17 rows keeled, the keels of median ones most distinct. Ventrals, 151; anal, divided; subcaudals, 101.

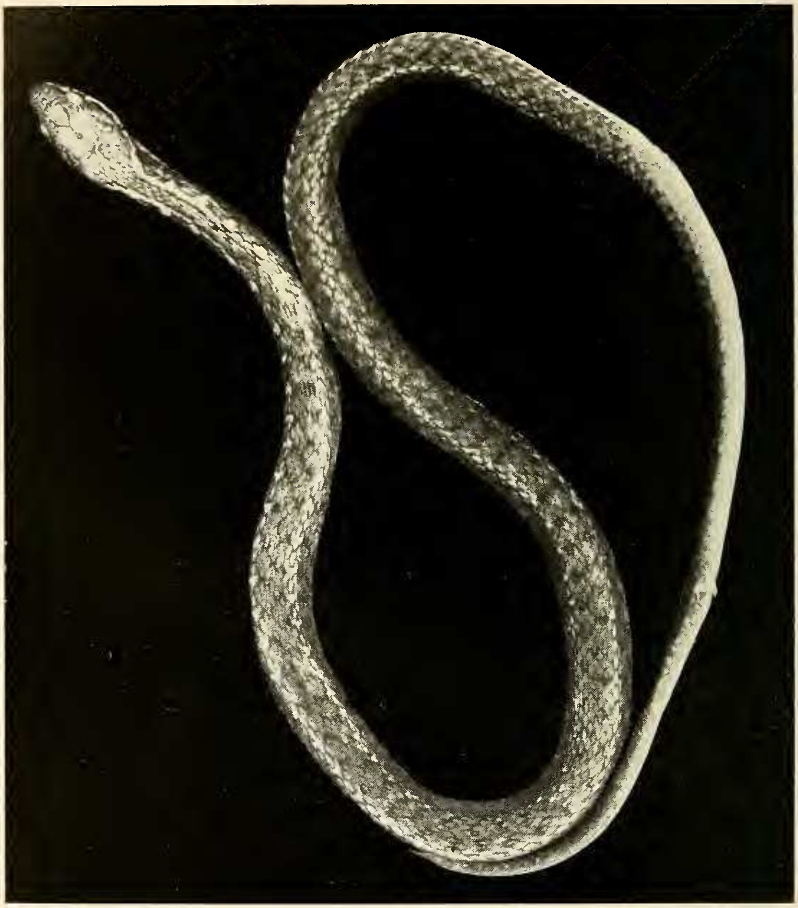

FIG. 54. *Natrix inas* (Laidlaw). B.M. No. 1916.3.27.31, Nakhon Si Thammarat, Thailand. Actual total length, 380 mm.

Color: Above olive-brown with a dorsolateral row of lighter spots anteriorly on fifth, sixth, and seventh scalerows which tend to join and form a continuous row posteriorly on the sixth scalerow; back with indefinite minute paired darker spots, often with a light fleck in center; ventral scales with outer edges dark, bordered below by a narrow cream spot and then a dark spot, the latter forming a broken line on ventrals; median two thirds of ventrals and subcaudals immaculate cream.

Head brown above with darker vermiculations and a pair of small cream spots on middle part of parietals; light cream stripes on upper lips from snout, across angles of mouth, converging, but not meeting, on neck, interrupted by black marks on sutures of anterior supralabials and posteriorly bordered above and below by black. Chin immaculate except for small black marks on sutures of infralabials.

Measurements in mm.: Snout to vent, 333; tail, 169; total length, 502; width of head, 8; length of head, 16.2.

Variation: The type was a much smaller specimen measuring 397 mm. with the ventrals 143, the subcaudals, 96. Laidlaw states "internasal shield broadly truncate, hinder maxillary teeth gradually enlarged." The total known variation in ventrals is 143 to 151; of the subcaudals, 96 to 109.

Distribution: In Thailand the species is known from Nakhon Si Thammarat and Prachuap Khiri Kahn. Outside of Thailand the species ranges in Malaya.

Remarks: The type-specimen was taken in the northern part of Malaya near the base of the mountain Gunong Inas, by Laidlaw and Yapp, at or near Sira Rimau. The specimen here described is presumed to have been taken at Huay Tam Phra, Prachuap Khiri Khan.

The specimen (figured) from Nakhon Si Thammarat, (B.M. 1916.3.27.31) agrees in detail with the markings of the described specimen. In this only two supralabials enter the orbit.

Natrix piscator (Schneider)

(Fig. 55)

Hydrus piscator Schneider, Historiae amphibiorum naturalis et literariae, fasc. primus . . . 1799, pp. 247-258 (type-locality, Coromandel Coast, by inference, the species based on Russell's Indian Serpents, vol. 1, pl. 33 Neeli Koea (Nihli Koeahat [Kuahat] as stated by Schneider).

Tropidonotus piscator (*part.*) Boulenger, The Fauna of British India, Ceylon, and Burma . . . Reptilia and Batrachia, 1890, p. 349.

Natrix piscator (*part.*) M. Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, 1943, pp. 293-298, figs. 95, 96 (Good synonymy and literature list).

This pictured form with the brief description given by Russel is of a snake lacking two black bars extending downwards and backwards from eye and a dark mark on the sides of the neck that is usually continuous with the second black bar; and having groups of small yellowish or cream spots on each side of the dorsum, together with a large number of darker spots often quincuncially arranged, the larger ones anteriorly, the smaller and less distinct ones posteriorly. The venter and subcaudal areas are yellowish white, rather than with black bars on each ventral.

In northern Thailand in Chiang Mai (city), Chiang Mai, there are two species of *Natrix* each about as common as the other, living together in the same pools. One of these I identify as Schneider's *piscator.* The other I regard as *Amphiesma flavipunctata,* which Hallowell originally described from Kwangtung province, China. It is unthinkable to regard them as subspecies of a single species.

The Chiang Mai specimens were acquired by Dr. L. D. Brongersma of the Leyden Museum, and myself, Dec. 5 to 8, 1958, while a tiny swamp, situated some 50 meters back of the Railway Hotel, was being fished before its seasonal drying. Approximately 14 specimens were taken of the larger darker species, agreeing in most details with Schneider's *piscator;* and some 30 specimens of a second species with clearly defined black neck markings, each ventral and subcaudal strongly barred with black. There was no evidence whatever that these forms were intergrading. The first species showed but little variation, while the second one displayed considerable variation in the dorsal pattern and the presence of reddish coloration in some specimens. However, every specimen showed clearly the black marks on ventrals. It cannot be a sexual difference since both males and females are in both groups. That two species are involved I believe there can be no question, despite strong similarity in the structural features. In Dr. Malcoln Smith's treatment of the species *piscator* he seemingly recognizes but a single form occurring in Thailand, which he calls *piscator flaviventris* (Hallowell) and it is certainly the second species mentioned above since he describes it as having the ventrals bearing black bars, and the occasional presence of reddish coloration on the body. The two may be differentiated by the following:

1. Larger snakes often reaching more than one meter in length, larger, usually quadrangular black spots arranged in longitudinal and diagonal rows, becoming smaller and less conspicuous posteriorly; a dorsolateral series of cream or yellow-cream spots covering parts of three or four scales extending more than half length of body; no distinct diagonal black mark on sides of neck; black diagonal marks from eye directed downwards and backwards dim or absent; chin, venter, and subcaudal region yellowish, the outer edges of ventrals grayish........................*piscator piscator*
2. Somewhat smaller snakes not reaching a meter in length; usually a row of vertical black spots on sides touching ventrals with a series of small black spots on back, separate or touching, sometimes forming a reticulum, lacking evident cream or yellow-cream dorsolateral spots but with very small dashlike yellowish marks on scale edges; two black lines from eye distinct, usually the posterior touching a diagonal black stripe on side of neck tending to join its fellow on nape; a pair of small ocelli on parietals and a light black-edged mark on occiput; ventrals each with a narrow black bar except first three or four. Occasional specimens showing considerable red on side of head, neck, and body............*flavipunctata*

Natrix piscator piscator (Schneider)

Certain subspecific forms of this species probably exist. I believe, however, that *Natrix piscator flavipunctata* of Smith (1943) should be regarded a distinct species from *piscator.* The two forms *piscator* and *flavipunctata* occur often in the same ponds, each maintaining its own specific characteristics without intergradation. The same is equally true of *Natrix asperrimus* * and of a form of *flavipunctatus* in Ceylon.

Since there is no indication of intergradation between the two Thai forms, I propose to treat them as species as has been done by many previous workers. The very large synonymy in the literature suggests much variation in the various populations and makes evident the difficulty of placing names and references without examination of the specimens on which the names were based. The table shows their similarities.

Diagnosis: See key above.

Description of species (from M. 34947, Phu Kading, Loei Prov.): Rostral one-and-one-third times as wide as high; internasals narrowed to one third of their width anteriorly, distinctly shorter than prefrontals; latter very little wider than long, suture with nasal very short; frontal longer than its distance from end of snout, one sixth shorter than combined parietals; nasal divided, anterior part much the larger, nostril near upper border of anterior part; loreal longer than high; one large preocular reaching top surface of head; three postoculars, the subocular the largest, almost reaching to below middle of pupil below eye. Temporals, 2 + 3; supralabials, 9-9, fourth and fifth bordering orbit rather narrowly; length of eye less than its distance from nostril; infralabials, 10-10, first five touching first chinshields which are shorter than second pair; latter separated by small scales.

Scale-formula: 24 (occiput), 19, 19, 17; farther back on neck median scales lightly keeled, five outer rows smooth (posteriorly only four or three rows smooth); scales not narrowed and elongated.

Ventrals, 132; subcaudals, 80; anals, 2. Maxillary teeth, 23, gradually increasing in size posteriorly.

Color: Olivaceous above with black spots quincuncially arranged, the spots in five or seven rows anteriorly but more or less connected by a dim reticulum; a row of cream or yellowish dots on

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* See Taylor, Univ. Kansas Sci. Bull., vol. 33, pt. 2, 1950, pp. 567-659, pl. 15, fig. 2, and pl. 21, fig. 1.

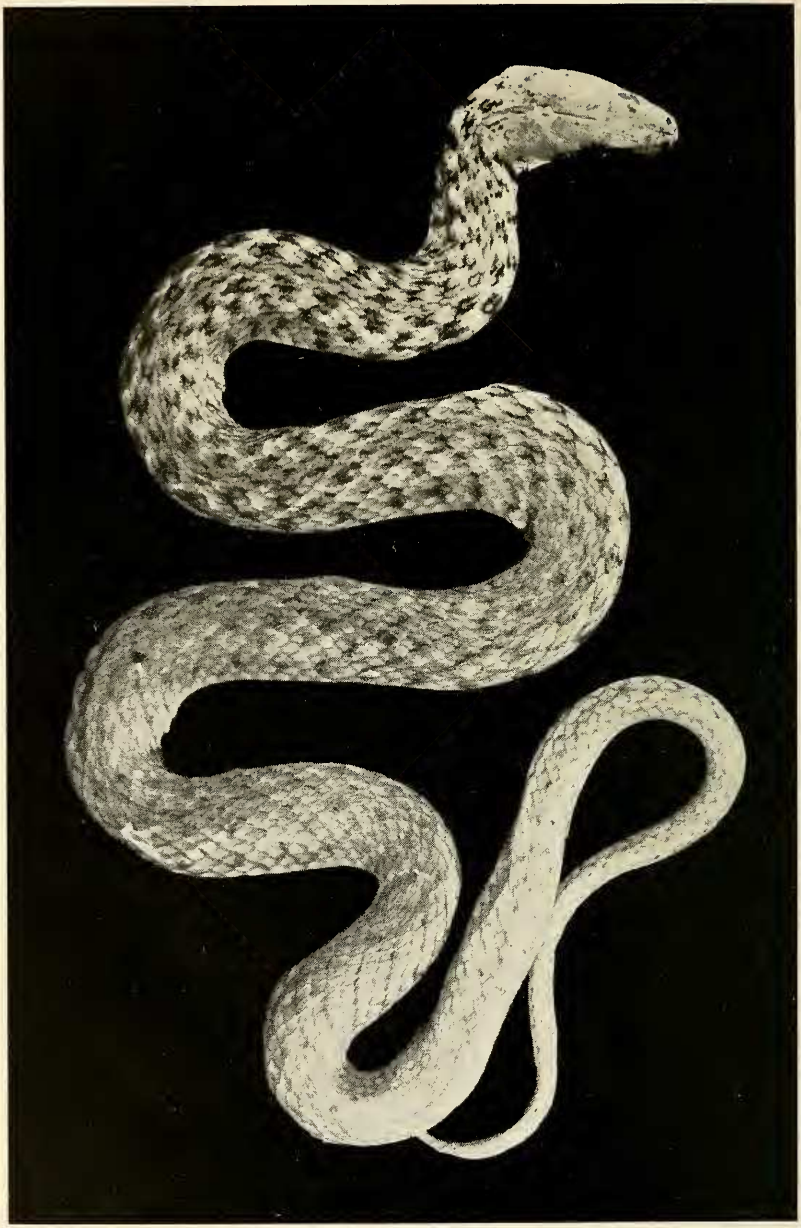

FIG. 55. *Natrix piscator piscator* (Schneider). No. 33843, Chiang Mai (city), Chiang Mai province, northern Thailand. Actual total length, 776 mm.; tail, 215 mm.

each side disappearing or becoming very dim beyond middle of body; labials dirty white with considerable pigment; a pair of diagonal lines from eye extend to mouth, the posterior reaching angle of mouth; area between these lightly pigmented. Chin, infralabials, entire venter and subcaudal region, cream-white; lateral border of ventrals grayish; lateral edges of subcaudals blackish, forming fine zigzag lines.

Measurements in mm.: Total length, 844; tail, 264; width of head, 22; length of head, 37.

Variation: A female specimen from Phu Kading Loei province differs a little from the preceding description as follows: the prefrontals are narrowed to about one half of their width; the anterior nasal is only slightly larger than posterior; the eighth labial is crowded out of the labial row by contact between ninth and seventh on border of mouth. There is a single elongate temporal followed by two secondary temporals. Ventrals, 144; subcaudals, incomplete, tip of tail missing.

The yellow lateral dots are often confined chiefly to interstitial skin and unless the skin is stretched, are not completely visible. The venter is immaculate save for a very narrow vague edging of gray on the outer part of ventrals.

Distribution: In Thailand this species seemingly is confined to the northern part. It is very common about Chiang Mai as is another form, *flavipunctata.* In the small pond just back of the Railway Terminal Hotel in Chiang Mai, approximately 30 specimens of *Natrix flavipunctata* and 14 *piscator* were obtained by Dr. L. D. Brongersma and myself in December, 1957.

Natrix flavipunctata (Hallowell)

(Fig. 56)

Amphiesma flavipunctatum Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 503, (type-locality, Canton River, Kwangtung, China).

Natrix piscator flavipunctata: M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 296; Taylor and Elbel, Univ. Kansas Sci. Bull.; vol. 38, pt. 2, 1958, pp. 1151-1152, (Khon San, Chaiyaphum province, Thailand).

Diagnosis: Scales weakly keeled anteriorly on all save three smooth outer rows (more posteriorly two rows or one without keels); posteriorly the keels are strongly developed; anteriorly internasals narrowed to about one third of their greatest width; fourth and fifth labials entering eye; temporals, 2 + 3; scales in 19 rows at middle. Ventrals and subcaudals each with a distinct black

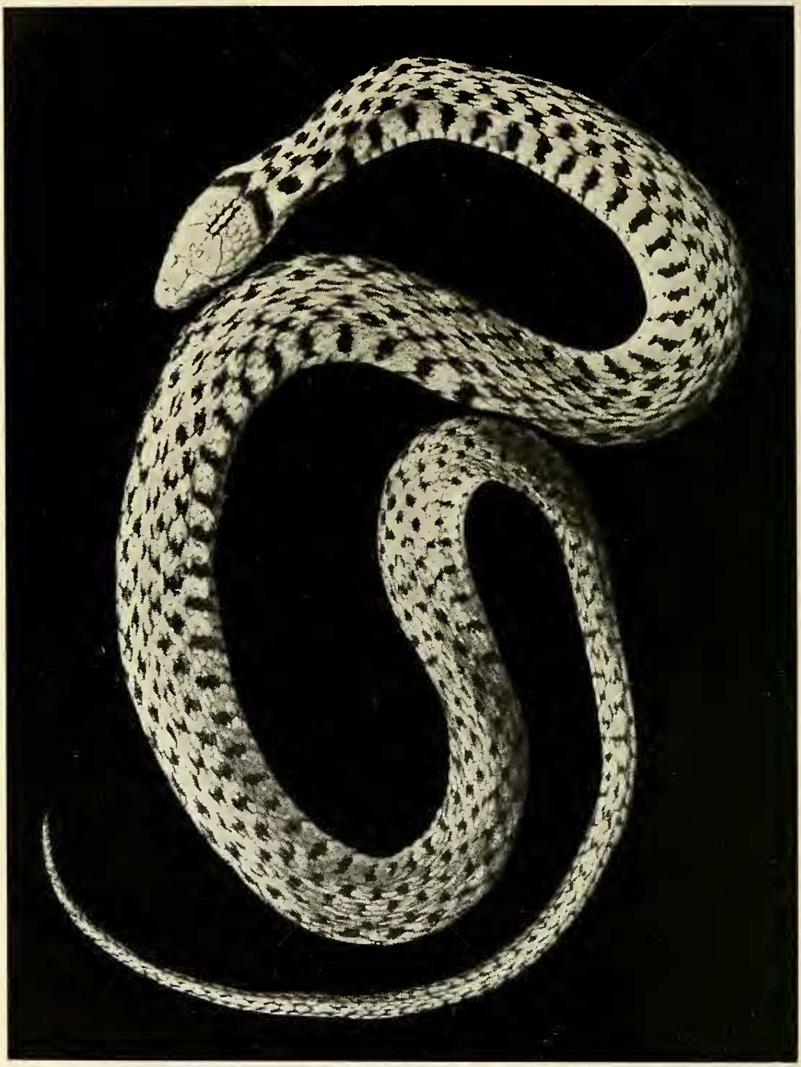

Fig. 56. *Natrix flavipunctata* (Hallowell). No. 33406, Chiang Mai (city), Chiang Mai province, northern Thailand. Actual total length, 701 mm.; tail, 197 mm.

posterior border; series of small dashlike diagonal yellow spots present on sides.

Description of species (from No. 78 ♀ Chiang Mai [city]): Rostral twice as wide as high, narrowly visible above; internasals narrowed to one third of their width anteriorly, a little shorter than prefrontals; latter only slightly wider than long; frontal slightly widest anteriorly, sides concave, longer than its distance from end of snout, little shorter than parietals; nasal completely or almost completely divided, anterior part somewhat the larger; loreal a little longer than high, touching three anterior supralabials; one preocular barely reaching upper surface of head; three postoculars, upper as large as lower, latter not reaching down on side of head as far as middle of pupil. Two anterior temporals, upper the smaller, three secondary temporals not well aligned; supralabials eight, fourth and fifth border orbit, sixth and seventh largest; eye slightly shorter than its distance from nostril; infralabials ten, five bordering first chinshields which are shorter than second pair; latter separated by small scales.

Scale-formula: 24 (occiput), 19, 19, 17, all keeled except three (two or one posteriorly) outer rows, rather weakly keeled anteriorly, but becoming stronger posteriorly. Ventrals, 132; subcaudals, 77; anal, divided.

Color in life: Head dark olive, the labials lighter. Two black parallel lines from eye directed downward and backward; space between dark lines, yellow or yellow-olive; two black lines from mouth angles converge on neck (or narrowly fail to touch); two tiny median black parallel lines on occiput. Body olive with black spots anteriorly, distinct laterally, rather obscure dorsally, but soon all more or less commence forming a reticulum, less distinct posteriorly; spots on tail absent or obsolete; venter greenish white, each ventral scale with a distinct black line on its posterior edge, and many body scales with small dashlike yellow marks.

Measurements in mm.: Total length, 567; tail, 164; width of head, 14; length of head, 24. The species reaches a length of 1200 mm.; the tail, 300 mm. (see table).

Distribution: The species is widely distributed in Thailand. Specimens are at hand from northern Chiang Mai. Chaiyaphum, Ubon, and Phattalung provinces, and the city of Bangkok. It is one of the commonest species in the country. Outside Thailand the species is found in southern China, India, Indo-China, Assam and northern Malaya.

Remarks: A large female specimen captured in the city of Bangkok contained 60 embryos.

Genus *Opisthotropis* Günther

Opisthotropis Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 9, p. 16 (type of genus, *O. atra*); Pope, The reptiles of China, Nat. Hist. Cent. Asia, vol. 10, 1935, pp. 164-166.

Table of data and measurements of *Natrix piscator* and *Natrix flavipunctata*

NUMBER	Sex	Ventrals	Sub-caudals	Pre-oculars	Post-oculars	Tem-porals	Supra-labials	Infra-labials	Total length	Tail
33839.........	♀	143	63+	1—1	3—3	2+3	9—9	10—10	773	186+
33840.........	♀	140	79	1—1	3—3	2+3	9—9	10—10	714	196
33842.........	♀	143	80	1—1	3—3	2+3	9—9	10—10	660	180
33843.........	♀	144	77	1—1	3—3	2+3	9—9	10—10	776	215
34058.........	♀	142	78	1—1	3—3	2+3	9—9	10—10	594	167
31808.........	♂	135	93	1—1	3—3	2+3	9—9	10—10	830	268
31809.........	♂	146	87	1—1	3—3	2+3	9—9	10—10	541	159
31810.........	♀	144	75+	1—1	3—3	2+2+2 2+2 2+3	9—9	10—10	1108	294
26.........	♂	131	80	1—1	3—2	2+3	9—9	10—10	843	257

Natrix flavipunctata

NUMBER	Sex	Ventrals	Sub-caudals	Pre-oculars	Post-oculars	Tem-porals	Supra-labials	Infra-labials	Total length	Tail
33406.........	♀	135	77	1—1	3—3	2+3	9—9	11—10	701	197
33823.........	♀	143	77	1—1	3—3	2+3	9—9	10—10	765	195
33824.........	♀	141	40+	1—1	3—3	2+3	9—9	10—10	546	88+
33846.........	♂	127	82	1—1	3—3	2+3	9—9	10—10	607	183
33848.........	♀	139	74	1—1	3—3	2+3	9—9	10—10	747	190
33849.........	♀	144	72	1—1	3—3	2+3	8—8	10—11	624	152
33856.........	♂	131	84	1—1	3—3	2+3	8—8	8—9	662	194
34897.........	♀	141	....	1—1	3—3	2+2 2+3	9—9	10—10	....	....
34898.........	♂	129	....	1—1	3—3	2+3	9—9	10—10	....	....
35900.........	♂	125	74+	1—1	3—3	2+3	9—9	10—10	547	161

Note. Numbers between 33823—33858, and 26, are from Chiang Mai; 31808-10 from Loei: 34897-35900 Ubon, Ubon.

This genus has had a series of generic increments at the hands of several authors; no less than six genera proposed in the last century have been added to it by Pope, and two by Malcolm Smith.[*]

Few genera, so recognized, have a more remarkable range in maxillary tooth-count. One group of species has the count between 22-27, while another species jumps the count from 36-42.

Only a single species is known from Thailand—this a mountain form from northern Chiang Mai, province.

Diagnosis: Paired internasals; fused prefrontals; frontal nearly as wide as long and about four times as wide as supraocular; loreal present; internasals broader than long; scales smooth in 17 rows; parietals distinctly longer than their distance to end of snout; first five supralabials higher than long.

Opisthotropis spenceri Smith

Opisthotropis spenceri Smith, Journ. Nat. Hist. Soc. Siam, vol. 3, no. 1, Nov. 1918, p. 13; pl. 2 (type-locality, "Muang Ngow, N. Siam"); The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 333, (known from 2 specimens both from the type-locality); Pope, The reptiles of China, Nat. Hist. Cent. Asia, vol. 10, 1935, p. 165; Bourret, Les serpents de l'Indochine, pp. 129-130, fig. 53.

Diagnosis: Scales in 17 rows; prefrontal single; loreal in contact with internasal; seven supralabials, fourth and fifth entering orbit; frontal four times wider than supraocular; first chinshield much larger than second; no enlarged posterior fangs.

Description of species (from type description): Snout broadly rounded, much depressed; nasal almost completely divided by a cleft running from internasal towards first labial; rostral nearly twice as broad as deep, well visible from above; internasals subtriangular, a little broader than long; prefrontal single, large, two and a half times as broad as long; frontal large, slightly longer than broad, as long as its distance from rostral, nearly four times as broad as supraocular; loreal a little longer than deep, in contact with internasal; one preocular, two postoculars; temporals, 1 + 2 or 2 + 2; seven supralabials, fourth and fifth entering orbit; five infralabials in contact with chinshields, the anterior pair of which is very much larger than posterior.

Scales in 17 rows throughout, entirely smooth, ventrals, 183; anal divided; subcaudals, 33 +. The maxillary teeth, 25; palatine, 14; pterygoid, 18; mandibular, 22.

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[*] These are *Calamohydrus* Boulenger 1888, *Helicopsoides* Mocquard 1890, *Trimerodytes* Cope 1895; *Tapinophis* Boulenger 1899, *Liparophis* Peracca 1904; *Cantinophis* Werner 1909, *Paratapinophis* Angel 1929, and *Parahelicops* Bourret 1934.

Color: Olive above, pale yellowish beneath, the colors mingling on three outer rows of scales. Subcaudals mottled with gray.

Measurements in mm.: Total length, 600; tail (imperfect), 72.

Remarks: A single female collected in September 1917 served for the type-description. A second specimen has been found in the type-locality.

Whether this species is correctly referred to this genus may be open to question, since *Opisthotropis* is presumably an African genus. It would seem however that, since the type was described, it has not been rediscovered in Africa. This would possibly throw grave doubts on the African origin except that the type species seemingly has not, to my knowledge, been discovered elsewhere.

Genus *Parahelicops* Bourret

Parahelicops Bourret, Bull. Inst. Pub. Gen. Hanoi, May, 1934, p. 170, (type of genus, *P. annamensis*).

Diagnosis: Natricine snake with 25-30 maxillary teeth, last two or three are enlarged ungrooved fangs; no apical pits; hypapophyses developed throughout vertebral column; scales keeled, in 17 or 19 rows; anal double or single; prefrontals fused into a single scale.

Only two species are recognized, a single one being known in Thailand.

This genus has been placed in *Opisthotropis* by Pope in 1936 and was followed by M. Smith in 1943—a synonymy which I do not follow. The type of the latter genus is said to be African in origin, and the dentition of *Opisthotropis* is—maxillary teeth 20 to 25, small, equal, a difference certainly of generic significance.

Parahelicops boonsongi Taylor and Elbel

(Fig. 57)

Parahelicops boonsongi Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, no. 13, Mar. 20, 1958, pp. 1156-1158, fig. 31, (type-locality, Ban Khok, Na Phung, Loei province, Thailand).

Diagnosis: A natricine snake, the scales in 19 rows, all strongly striate and keeled; a single prefrontal; two suboculars; above nearly uniform gray-olive in coloration, growing lighter on the sides; venter cream-white; a median gray subcaudal line (at least at base of tail).

Description of species (from the type-description): Rostral once and a half as wide as high, very narrowly visible above; internasals elongate, narrowed and truncate anteriorly, rounded posteriorly, their length slightly greater than length of prefrontal; latter twice as wide as long; frontal five-sided, slightly wider anteriorly than elsewhere, a little shorter than supraoculars, equal to its distance from rostral, a third shorter than parietals; nasal elongate, partly divided by a suture from nostril to second supralabial; loreal as high as long; a large preocular not reaching frontal; two or three postoculars; two suboculars, the anterior reaching beyond middle of eye; temporals, 2 + 3 + 4; nine supralabials, first three touching nasal, third only touches loreal, fourth and fifth entering orbit, seventh largest; mental wider than long, as wide as rostral; infralabials ten, five touching first chinshields which are distinctly shorter than second pair; latter pair separated by scales, narrowly so anteriorly.

Scalerow formula: 25 (occiput), 19, 19, 17, all keeled except anterior part of outer row, which is smooth but faintly keeled posteriorly; posterior edges of scales notched (bidentate), bearing a fine transparent fringe.

Ventrals, 141; anals, 2; subcaudals 33 + (tail broken and part lost). Eye rather large, its diameter equal to its distance from nostril; pupil round. Maxillary teeth 30, the last three suddenly much enlarged, but not grooved.

Color: Nearly uniform gray-olive above, growing a little lighter laterally, becoming nearly cream-white on outer two or three scalerows anteriorly on side of neck; posteriorly outer two scalerows and to some extent outer edge of ventrals, with some grayish pigment; supralabials and suboculars cream; an indefinite fumate spot back of jaw-angle; venter generally cream-white; subcaudal region with a median gray line and many scales with an indefinite pigmented area. When specimen is submerged in clear liquid it is possible to discern dimly some indefinite darker areas on anterior half of body.

Measurements in mm.: Snout to vent, 520; tail 101 +; total length, (part of tail missing) 621 +; length of head, 26; width of head, 18; width of neck, 13.

Remarks: The species is still known only from the type. It is presumed to be a northern form that has entered Thailand from the northwest but has not penetrated far. It should be looked for in the mountains of Laos and Yunnan.

Genus *Pseudoxenodon* Boulenger

Pseudoxenodon Boulenger, The fauna of British India, including Ceylon, and Burma . . . Reptilia and Batrachia, 1890, pp. 340-341 (type of genus, *P. macrops*).

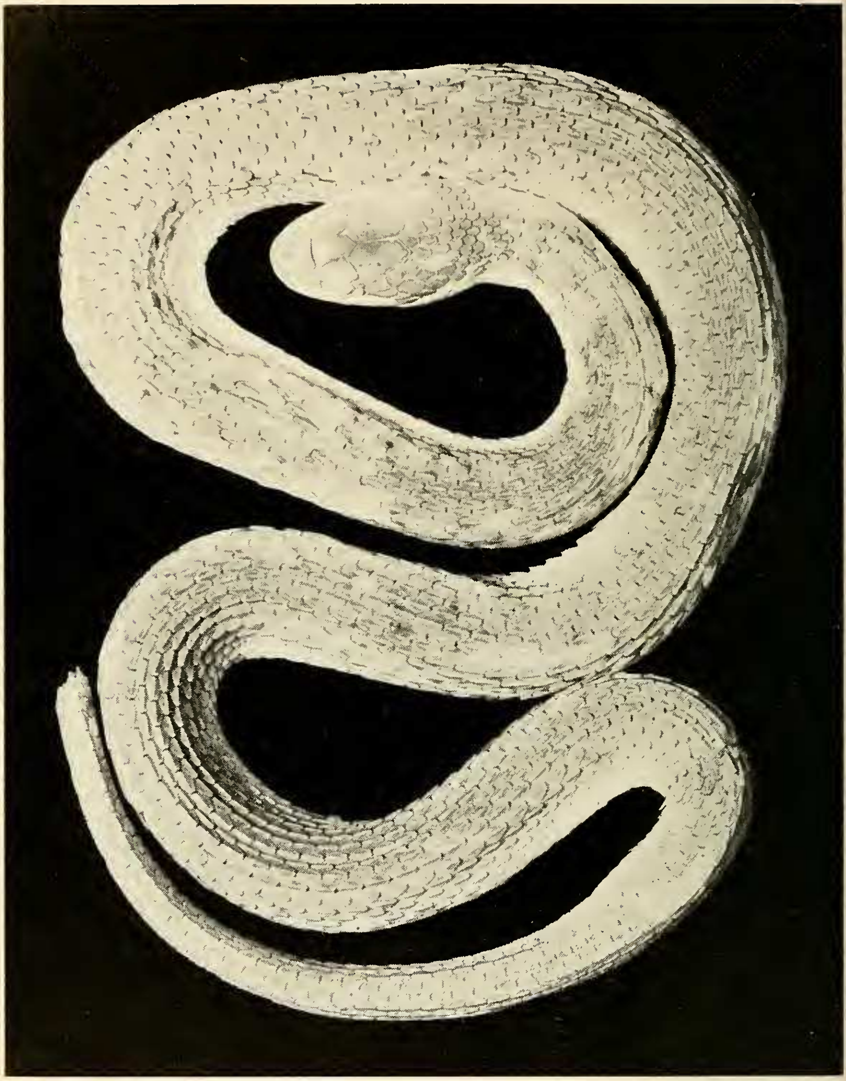

FIG. 57. *Parahelicops boonsongi* Taylor and Elbel. Type. EHT-HMS No. 31707, Ban Khok, Na Phung, Dansai, Loei province. Actual total length, 621 + mm. (From Taylor and Elbel.)

Diagnosis: Head moderately distinct from neck; eye large, pupil round; body cylindrical; scales obliquely disposed, keeled, lacking apical pits, in 17 to 19 rows. Ventrals rounded, subcaudals double. Maxillary teeth, 20-28, increasing in size posteriorly, last two abruptly enlarged and separated by a short diastema from others.

Only one species has been captured in Thailand, a wide-spread form whose range extends from the Eastern Himalayas of Nepal to Northern Thailand and Annam; south to the northern part of the Malay Peninsula. It is not known whether or not the distribution is continuous in Thailand. Seemingly no specimens have been taken between northern Thailand and northern Malaya. It is however known throughout Burma and is doubtless present in Thailand in the border highlands.

Pseudoxenodon macrops (Blyth)

(Fig. 58)

Tropidonotus macrops Blyth, Journ. Asiat. Soc. Bengal, vol. 23, 1854, p. 296 (type-locality, Darjeeling, India).

Some two or three forms have been described that are probably subspecies of *macrops* (*sinensis, uniformis*), only one of which, the typical form, appears to enter Thailand.

Pseudoxenodon macrops macrops (Blyth)

Tropidonotus macrops Blyth, Journ. Asiat. Soc. Bengal, vol. 23, 1854, p. 296 (type-locality, Darjeeling, India); Stoliczka, Journ. Asiat. Soc. Bengal, vol. 40, 1871, p. 436.

Pseudoxenodon macrops Boulenger, The fauna of British India, including Ceylon, and Burma . . . Reptilia and Batrachia, 1890, pp. 340-341; Catalogue of the snakes in the British Museum, vol. 1, 1893, pp. 270-271; Venning, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910-11, p. 340, 772; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 321; *ibid.*, vol. 19, 1909, pp. 341, 898; Smedley, Bull. Raffles Mus., no. 5, 1931, p. 51; Pope, The reptiles of China, Turtles, Crocodilians, Snakes, Lizards, in Natural History Central Asia, vol. 10, 1935, pp. 151-153 (subspecies); M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 484; The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 311-313. Tweedie, The snakes of Malaya, 1954, p. 73 (Cameron Highlands, Malaya).

Pseudoxenodon macrops macrops:[*] Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, no. 13, Mar. 20, 1958, p. 1149, fig. 29 (Ban Muang Khai, Ban Khok, Loei Province).

Tropidonotus sikkimensis Anderson, Journ. Asiat. Soc. Bengal, vol. 40, 1871, p. 17 (type-locality, Darjeeling, India).

Tropidonotus angusticeps Blyth (*part.*), Journ. Asiat. Soc. Bengal, vol. 23, 1854, p. 295 (type-locality, Darjeeling, India); Sclater, Journ. Asiat. Soc. Bengal, vol. 40, 1891, p. 240.

Pseudoxenodon angusticeps: Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 608; Bourret, Les serpents de l'Indochine, 1936, p. 111; Shaw, Shebbeare, and Barker, Journ. Darjeeling Nat. Hist., Soc., vol. 13, 1939, p. 151.

Diagnosis: Medium-sized snake reaching a little more than one meter in length; two nasals, one preocular, three postoculars; eight supralabials, two entering orbit; scales in 19, (19-17), 15 rows, keeled. A series of yellowish to orange transverse or oblique dorsal spots bordered by black. Head uniform olive-brown with a broad black chevron on neck preceded by a narrow orange chevron, and followed by a broader light (yellow to orange) chevron; one or two series of small lateral dark spots; anterior part of venter strongly marked with black, posterior part immaculate or clouded.

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[*] *Pseudoxenodon macrops sinensis* has been described from Yunnan Fu.

Description of species (from No. 683): Rostral about one fourth wider than high, well visible above, rounded posteriorly; internasals wider than long; prefrontals one-fifth wider than long; frontal longer than its distance from tip of snout, shorter than a parietal; latter, one third longer than wide; nasal divided; loreal as long as

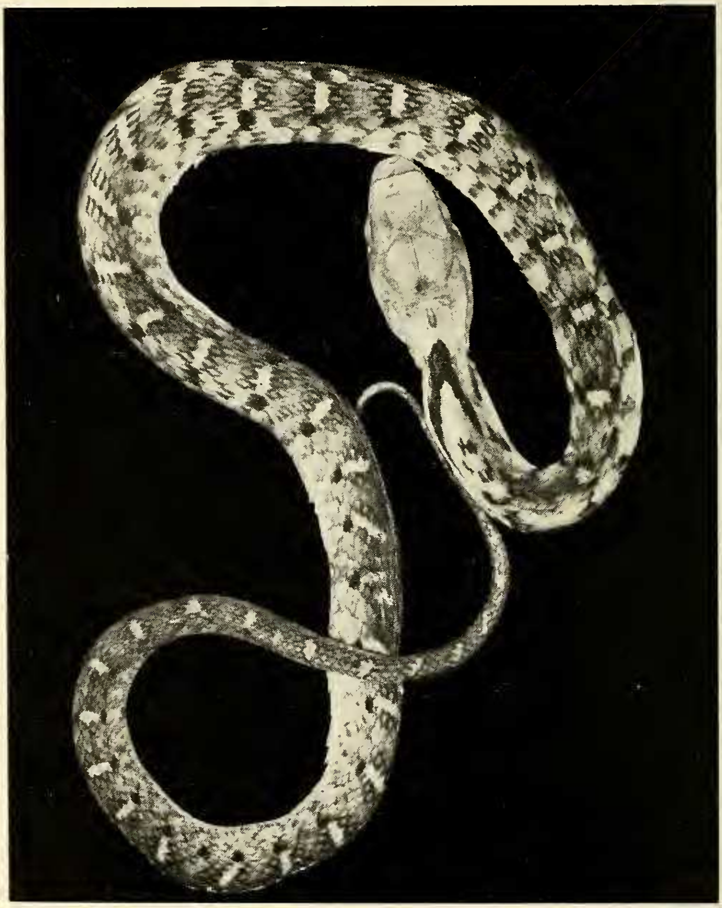

FIG. 58. *Pseudoxendon macrops macrops* Blyth. EHT-HMS No. 31704, yg. Phu Nam Lang (Mt.) 1780 m., Ban Khok, Na Phung, Dansai, Loei province Central Thailand. Actual total length, 263 mm. (Note the head is proportionately large in the young.) From Taylor and Elbel.

high; two preoculars, upper largest, barely reaching top of head; three postoculars, upper touching parietal, both touching a single anterior temporal; temporals irregular; large temporal behind anterior temporal bordering parietal; eight supralabials, fourth and fifth border orbit, seventh much the largest; diameter of eye equal to length of snout; infralabials, 10-9; four or five touching first chinshields which are as long as second pair.

Maxillary teeth, 24-25, increasing a little in size and followed after a diastema by two enlarged fangs, directed backwards. Scalerows: 21 (occiput), 19, 19, 15; ventrals, 169; anal, divided; subcaudals, 67.

Color (in preservative): Head grayish brown, little lighter on tip of snout; labials cream except that between seventh and eighth there is a black line; infralabials, chin, and anterior part of throat cream; a narrow light nuchal chevron reaches almost to parietals, followed by a broader chevron of deep black; this followed in turn by a light chevron; body with a series of dorsal light (orange) spots rather longer than wide anteriorly, narrower and sometimes obliquely placed, wider than long more posteriorly; farther back on tail becoming as long as wide; 30 spots on body, 12 on tail; these preceded and followed by gray-black with a rather discrete dark-black mark on either side; low on sides another row of dark spots; centers of scales involved but lighter on centers; venter cream anteriorly with heavy black marks that grow smaller and less numerous and light brown in color on second third of body; last third dirty cream with only very indefinite marks; a slightly dark median subcaudal line tending to disappear posteriorly.

Measurements in mm. (Nos. 683 and 34151): Total length, 546, 618; tail, 98, 113; width of head, 11.8, 15; length of head, 21, 22.

Variation: Another specimen, No. 34151, agrees with or differs from the above as follows: The rostral is angular behind; the frontal shorter than the distance to the tip of snout; a loreal much higher than wide; one preocular, three postoculars; two anterior temporals; posterior chinshields longer than anterior. Another specimen in the collection (without number) has the scale formula, 25, 19, 15, 15. There are 159 ventrals and 69 subcaudals; there are 30 spots on the body, 14 on the tail. Two specimens from Loei province reported by Taylor and Elbel have, 171, 174 ventrals; 63, 67 subcaudals respectively.

Distribution: Thailand specimens are known from Loei province and from Pa Meang, Chiang Mai province in the northwestern part of the country.

Remarks: One Loei specimen 882 mm. in length, has 10 ovarian eggs. The specimen described is from an unknown Thai locality.

Genus *Macropisthodon* Boulenger

Macropisthodon Boulenger, Catalogue of the snakes in the British Museum (Natural History), 2nd Ed., vol. 1, 1893, p. 265, fig. 17 (type, *Macropisthodon flaviceps*).

Diagnosis: Head distinct from neck; eye medium in size, with round pupil; scales strongly keeled, in 19 to 27 rows. Apical pits; ventrals rounded; subcaudals paired. Maxillary teeth 11 to 18 after a short hiatus two large ungrooved fanglike teeth, pointing backwards. Hypapophyses present throughout.

The genus has two of its four representatives in Thailand. Of the others, one is an Indian species and one Chinese. The Thai species may be identified by the following key:

KEY TO THE SPECIES OF *Macropisthodon* IN THAILAND

1. Maxillary teeth 20-22, including fangs; eight upper labials normally. Body black; a broad orange band across neck separated from head by a broad black band; belly olive with black cross-bands, or entirely black, *flaviceps*
2. Maxillary teeth 14 to 17; seven or eight supralabials. Body grayish rose or reddish brown with a dark brown or black vertebral stripe which becomes a broad V-shaped patch on neck; sides of venter pink, middle part yellow with very small black punctations in a broken row along outer edge of ventrals . . . . *rhodomelas*

Macropisthodon rhodomelas (Boie)

(Fig. 59)

Tropidonotus rhodomelas Boie, Isis, 1827, p. 535 (type-locality, Java).

Macropisthodon rhodomelas: Boulenger, Catalogue of the snakes in the British Museum (Natural History), 2nd Ed., vol. 1, 1893, pp. 266-267; Flower, Proc. Zool. Soc. London, 1896, pp. 880-881; *ibid.*, 1899, p. 664; Ridley, Journ. Straits Branch Roy. Asiat. Soc., 1899, p. 198; Boulenger, A vertebrate fauna of the Malay Peninsula . . . 1912, pp. 129-130; Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 160; Smith, Journ. Federated Malay States Mus., vol. 10, 1922, p. 265; Sworder, Singapore Nat. no. 2, 1922, p. 63; Smith, Bull. Raffles Mus., no. 3, 1930, p. 45; Tweedie, The snakes of Malaya, 1954, pp. 73-74.

Diagnosis: Maxillary teeth, 14-17 followed by two large fangs; nostril between two nasals that are completely or almost completely separated; one loreal, one preocular, three anterior temporals; a black median line expanding anteriorly into a broad V-shaped dark blue or blackish mark.

Description of species (from No. 115, Royal Forest Department Coll., from Khao Chong, Trang): Rostral one third wider than high, very narrowly visible above; internasals shorter and narrower than prefrontals; prefrontals broader than long, forming a

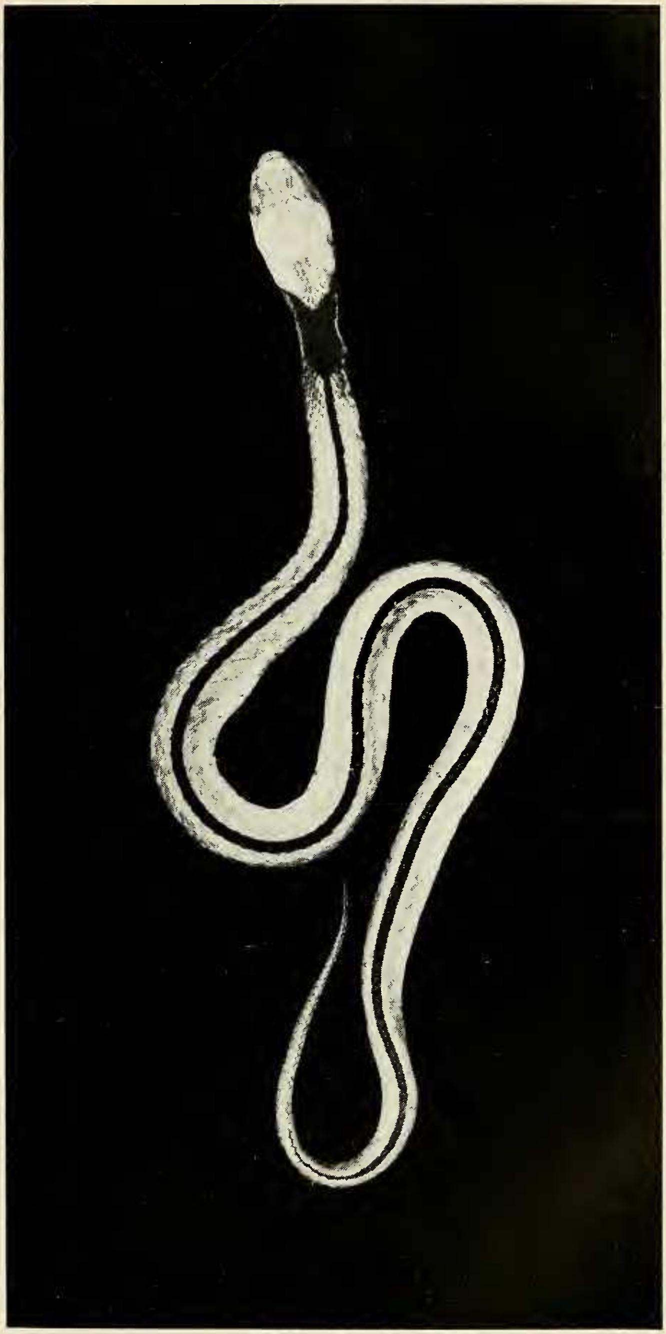

FIG. 59. *Macropisthodon rhodomelas* (Boie). Royal Forest Department No. 115, Khao Chong, Trang province. Actual total length, 286 mm.; tail, 62 mm.

straight suture with frontal; latter slightly longer than its distance to tip of snout, slightly less than its distance from back level of parietals; nasal divided; a loreal as high as long; a single preocular not reaching top of head or frontal; three postoculars, two lower ones elongated; temporals, three anterior, three posterior, with an extra scale intercalated on one side; supralabials, 8-8, fourth and fifth bordering orbit; diameter of eye greater than its distance from nostril; mental triangular; infralabials, 10-10, five touching first chinshields, which are as broad, but considerably shorter than second pair; first pair widened; first ventral directly in contact with second pair of chinshields.

Scale-formula: 29, 23, 19, 19; "apical pits" evident in shed scales as two transparent spots somewhat back from apex, scarcely discernible otherwise; scales keeled except on two (or one) outer rows and on sides of neck. Ventrals, 134; anal, divided, subcaudals, 47, divided, except terminal one. Maxillary teeth, 14-17, last two strongly enlarged and directed backwards.

Color: Top of head, except posterior part of parietals and in supraorbital areas, olive yellow; posterior parts of occiput and temporal regions lavender; nape of neck rosy with two faint darker lines evident, extending from a broad V-shaped nuchal mark to occiput; from posterior part of nuchal mark emerges a discrete black line, covering median scalerow and slightly more than half of adjoining rows, extending to tip of tail; sides of neck rather gray-blue; a small black line along edges of three ventrals; sides rosy pink with fine diagonal darker lines indicated, extending down and forward on sides, each separated by two transverse diagonal rows of scales; a broken, very incomplete line of punctate black marks on outer edge of ventrals; side of venter slightly rosy pink, middle chiefly yellow; tail whitish below, the pink less intense above and disappearing distally.

Measurements in mm.: Snout to vent, 286; tail, 62; width of head, 10.2; length of head, 18.

Variation: A specimen which I captured at Khao Chong had the following coloration in life: Top of head, dark brown, the labials lighter pinkish brown; occiput a lighter brown than top of head; sides with alternate diagonal lines of rusty pink one scalerow wide, separated by two rows of yellowish-brown scales; a black median line from base of tail to neck where it widens into a broad chevron-shaped spot of coal-black, the lateral tips reaching the jaw-angles; scales on neck, along this black spot, bluish gray; entire underside of head and body flesh pink growing cream near the base of the tail and on subcaudal area; infralabials and chinshields ivory white.

The variation reported for the ventrals is 124 to 138; for subcaudals, 42 to 58. The usual number of labials is seven in which case the third and fourth labials border the orbit; four postoculars may occur.

Distribution: Known in the southern part of peninsular Thailand, having been taken in Trang.

Specimens are known also from Malaya, Singapore, Borneo, and Java.

Remarks: This species has the habit of dilating the neck and behaving somewhat in the manner of the cobra.

Macropisthodon flaviceps (Duméril and Bibron)

Amphiesma flaviceps Duméril, Bibron and Duméril, Erpétologie générale . . . vol. 7, 1854, p. 738 (type-locality, Borneo); Jan, Arch. Anat. Fis., vol. 3, 1865, p. 235; Jan and Sordelli, Iconographie générale, livr. 29, 1868, pl. 3, fig. 1.

Tropidonotus leucomelas Günther, The reptiles of British India, 1864, p. 271, pl. 22, fig. 1 (type-locality, "Pinang"); Müller, Verh. nat. Ges. Basel, vol. 7, 1882, p. 148.

Tropidonotus flaviceps: Günther, Proc. Zool. Soc. London, 1872, p. 590; Fischer, Arch. für Nat., 1885, p. 53.

Macropisthodon flaviceps: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 266; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 128-129; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1922, p. 266 (Kuala Tahan, Malaya); M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 45 (Bandon, most northern record); Tweedie, The snakes of Malaya, 1954, p. 74.

Diagnosis: Maxillary teeth, 18-20 + 2 enlarged fangs; eight upper labials (rarely seven); posterior chinshields longest; one preocular; scales keeled, in 19 rows at middle. Body black with grayish white or pale olive cross-bars, widening towards sides; a broad orange band across neck separated from head by a black band; venter olive with black cross-bands or entirely black.

Description of species: Maxillary teeth 18-20 + 2 enlarged fangs. Rostral twice as broad as deep; internasals shorter than prefrontals; frontal a little longer than broad, as long as or a little shorter than its distance from end of snout, shorter than parietals; loreal as long as deep or deeper; one preocular; three or four (rarely two or five) postoculars; temporals, 2 + 2 or 2 + 3; eight (rarely seven) upper labials, fourth and fifth (or third and fourth) entering eye; five or six lower labials in contact with anterior chinshields; posterior chinshields longer than anterior.

Scales very strongly keeled in 19 rows. Ventrals, 120-138; anal, divided; subcaudals, 49-60.

Color: Body black; young with greyish-white or pale olive cross-bars, widening towards sides and of which at least traces persist in the adult; a broad orange band across nape, sometimes disappearing in adult, separated from head, which is yellowish brown or olive, by a broad black band; venter olive, with black cross-bands, or entirely black (from Boulenger 1912).

Measurements in mm.: Total length, 840; tail, 190.

Distribution: In Thailand the species has been taken at Bandon, Surat Thani province. This is the only record as well as the most northern record. The species is known in the Malay Peninsula south of Thailand, where it is common, and it is present also in Sumatra and Borneo.

Genus *Rhabdophis* Fitzinger

Rhabdophis Fitzinger, Systema reptilium, 1843, p. 27, type of genus *Natrix subminiata* (Schlegel).

Diagnosis: A group of semiaquatic snakes having 22-35 maxillary teeth, last two teeth enlarged into ungrooved fangs, directed backwards; some species with nuchal glands and a more or less distinct nuchal groove (*subminiatus, nigrocinctus*); lacking in other Thai forms; eye rather large, pupil round; scales in 19 keeled rows; subcaudals paired, anal divided.

Four species of this genus are known in Thailand; three of them seem to be lowland in habitat, ascending low hills and the lower parts of mountains; *stolatus* on the other hand is reported as ascending to about 2000 m. It likewise occurs in lowlands in Thailand.

It is difficult to explain the absence of the nuchal glands in *stolatus* and *chrysargus* since the presence of these organs might be regarded as a generic character.

The following key will differentiate the four species:

KEY TO SPECIES OF *Rhabdophis* IN THAILAND

1. Glands present in nuchal region 2
   Nuchal glands absent 3
2. Maxillary teeth, 24-26; one preocular; normally eight supralabials, third, fourth, and fifth bordering eye. Olive brown or greenish, uniform or reticulated; head dark, blackish color extended on neck, followed by reddish or vermillion area for a short distance. Belly yellowish, ventrals often with black outer dots .... *subminiatus*
   Maxillary teeth 27-29. One or two preoculars; nine (rarely eight) supralabials, fourth, fifth, and sixth labials bordering eye; olive green with vertical black bars on sides or narrow cross-bars (rarely absent or dim); lips white with two black oblique stripes .... *nigrocinctus*

3. Two light stripes on back; internasals much narrowed anteriorly; venter white with occasional black dots on anterior fourth of body; 21-24 maxillary teeth..*stolatus*

   No light stripes, internasals but little narrowed anteriorly; a white chevron on neck pointing backward; ventrals usually with black spots and a rather heavy peppering of gray pigment; 27-35 maxillary teeth......*chrysargus*

Rhabdophis subminiatus (Schlegel)

(Fig. 60)

Tropidonotus subminiatus Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 313 (type-locality, Java).

This species, with a very wide distribution extending from Java to Sikkim and Kwangsi (in China), shows considerable variation. Several subspecific forms have been described, some of which are good, some questionable. In Thailand two forms have been recognized—the typical *subminiatus subminiatus* and a northwestern, high-altitude form—*subminiatus helleri* Schmidt. The two may be separated as follows:

KEY TO THE FORMS OF *Rhabdophis subminiatus*

1. A distinct oblique black bar below eye; center yellowish sometimes with a black dot on outer end of each ventral shield. Neck with a vermillion band, the color largely on skin between scales. Ventrals, 137-164, subcaudals, 72-89. Nuchal glands and groove not conspicuous (may be absent in the south *fide* M. Smith); length to 750 mm., *R. subminiatus subminiatus*
2. Adults almost uniformly colored; *venter powdered gray;* the subocular bar present, absent, or indistinct; paired glands and a groove present on neck, usually distinct. Ventrals, 157-173, subcaudals, 72-96, length to 1300+ mm..*subminiatus helleri*

Rhabdophis subminiatus subminiatus (Schlegel)

Tropidonotus subminiatus Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 313 (type-locality Java); Günther, The reptiles of British India, 1864, p. 265; Flower, Proc. Zool. Soc. London, 1899, p. 662; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 56, 65; Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 347; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, p. 256; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 126-127; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 320; *ibid*., vol. 19, 1909, pp. 341, 618; Venning, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910-1911, pp. 341, 773; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, pp. 15, 187, 213, 245, *ibid*., vol. 2, pt. 2, 1916, p. 158 (Narathiwat and Nakhon Si Thammarat).

Rhabdophis subminiatus: Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 606; *ibid*., vol. 30, 1925, p. 810; *ibid*., vol. 31, 1926, p. 561; Bourret, Les serpents de l'Indochine, 1936, p. 95.

Natrix subminiata: Sworder, Singapore Nat., no. 3, 1924, p. 21; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 44; Proc. Zool. Soc., 1938, p. 579; Tweedie, The snakes of Malaya, 1954, pp. 69-70, text fig. 16b.

Natrix subminiatus subminiatus: M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 302-303, fig. 95, ch. (teeth).

?*Natrix subminiata hongkongensis* Mell, Lingnan Sci. Journ., vol. 8, 1931, p. 203 (type-locality, Hong Kong).

?*Natrix subminiata siamensis* Mell, Lingnan Science Journ., vol. 8, 1931, p. 203 (type-locality, Siam); Gressit, Peking Nat. Hist. Bull., vol. 15, 1941, p. 187.

Rhabdophis subminiatus helleri: Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1152-1153 (*part.*).

NOTE: It is not certain that all the references here included actually belong to the typical form.

Diganosis: A medium-sized form with a series of nuchal glands; nuchal scales not enlarged, nuchal groove may be indistinct. Maxillary teeth, 24-26, last two abruptly and strongly enlarged; internasals as long as prefrontals in southern—, shorter in northern specimens; one preocular; scales in 19 rows at middle. Neck vermillion, following an olive-green nuchal band.

Description of species (from No. 24 ♂ Bangkok, Thailand): Rostral about one-fourth to one-third wider than high, narrowly visible above; internasals distinctly shorter than prefrontals, narrowed to half their width anteriorly; prefrontals at least one-third wider than long; laterally forming sutures with three scales, that with loreal shortest; frontal length approximately equal to its distance from end of snout, shorter than parietals; nasal divided, posterior portion highest, forming an angle above; loreal about as high as long; preocular barely reaching upper surface of head; three postoculars; temporals, 2 + 3, lower anterior smallest; eight supralabials, third, fourth, and fifth entering obit; sixth and seventh subequal or seventh largest; length of eye equal to its distance from front edge of nostril; nine infralabials, four or five touching first chinshields which are considerably shorter than second pair; latter scales separated by small scales.

Scale-formula: 24 (occiput); 21, 19, 17, outer row smooth, others strongly keeled, most scales bidentate posteriorly; ventrals, 169; subcaudals, 62; anal, divided.

Color in life: Head olive becoming olive-green on neck, bordered behind by a somewhat lighter edge coming to a point posteriorly on nape; neck more or less vermillion to rusty red with dark spots arranged quincuncially, gradually becoming grayish olive; skin on body alternately blackish and yellowish, the color sometimes encroaching on edges of adjoining scales thus producing a very indefinite pattern until skin of body is stretched, separating scales, when this pattern becomes strongly evident; towards posterior part of body the pattern becomes indefinite; labials cream with a prominent black diagonal line below eye, directed downwards and backwards. Ventrals grayish olive on outer ends; mesial portion

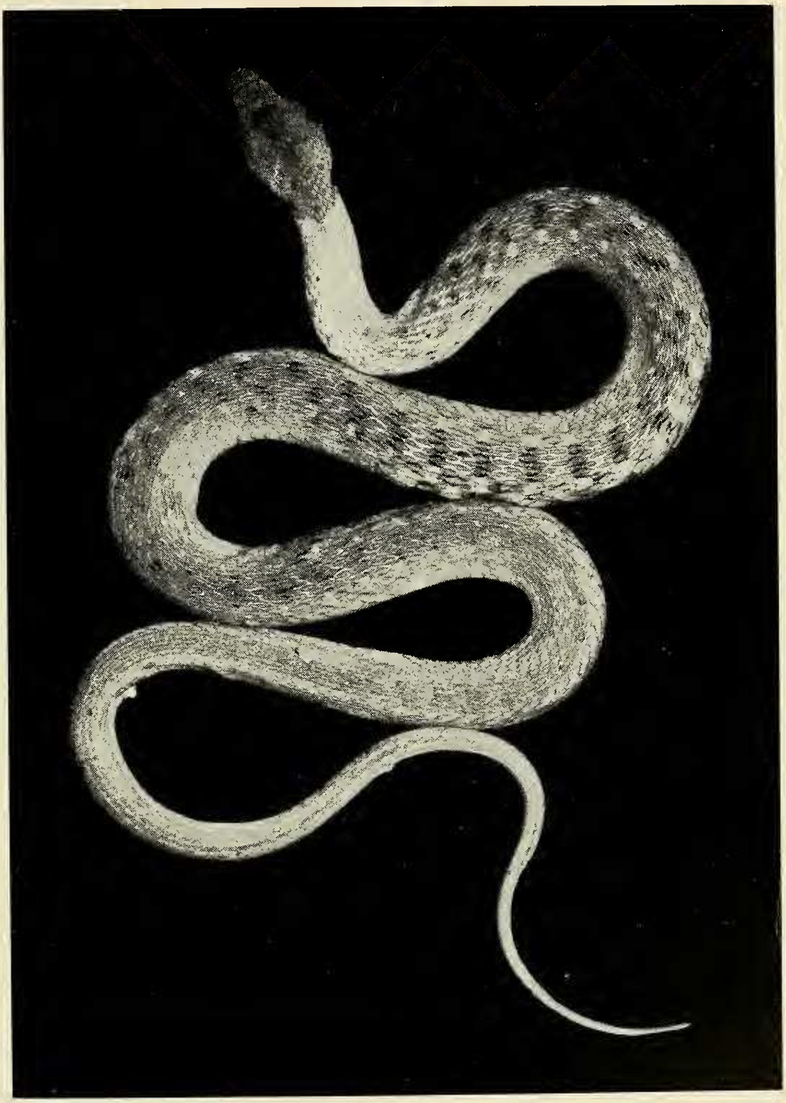

FIG. 60. *Rhabdophis subminiatus subminiatus* (Schlegel). No. 3337♂, Bangkok (city), Thailand. Actual total length, 628 mm.; tail, 178 mm.

of venter yellowish on throat and neck, becoming grayish to ivory posteriorly.

Measurements in mm.: Snout to vent 630; tail (part missing), 160.

Variation: The known range in ventrals is from 137 to 164; in the subcaudals from 72 to 89. The lower ventral and higher subcaudal counts are those found in males. The species reaches a known length of a little less than 800 mm., growing perhaps a little larger in the northern part of its range. The number of maxillary teeth in specimens from Ronpibon, Nakhon Si Thammarat is 20 (21) + 2 in three specimens, while one has 23 (21) + 2. There may be nine supralabials.

Distribution: The species occurs in northern Thailand to about latitude 22° N, and extends to southern Thailand. Specimens are known from Chiang Mai, Bangkok, Nakhon Si Thammarat and Narathiwat. Outside of Thailand it occurs in Indo-China and Malaya.

Remarks: The specimen figured was apprehended in the kitchen of a dwelling house in the city of Bangkok by Mrs. Kenneth Dilks, Lecturer, Chulalongkorn University, who kindly presented the specimen to the University collection.

When the snake is excited it often elevates its head and flattens and distends the body thus displaying the hidden pattern between the scales.

Rhabdophis subminiata helleri K. Schmidt

Natrix helleri Schmidt, Amer. Mus. Novitates, no. 157, 1925, p. 3 (type-locality, Tengyueh 5500 ft. altitude, Yunnan, China. Dr. M. Smith (1943) gives Nodoa, Hainan as the type-locality, which is the type-locality of another species of *Natrix* also described on the same page by Schmidt. This is presumably a clerical error unless it represents a correction of the previously stated type-locality).

Tropidonotus subminatus: Anderson, Zool. Res. West Yunnan, 1879, p. 822.

Natrix subminiata helleri: Pope, The reptiles of China, 1935, pp. 132-135, fig. 30; M. Smith, Rec. Indian Mus., vol. 37, 1935, p. 239; *ibid.,* vol. 42, 1940, p. 483; The fauna of British India, Ceylon and Burma including the whole Indo-Chinese Subregion; Reptilia and Amphibia, vol. III, Serpentes, Dec. 1943, pp. 302-303; Fan. Bull. Dept. Biol. Col. Sci. Sun Yat Sen Univ., no. 11, p. 60 (Kwangsi); Mell, Lingnan Sci. Journ., vol. 8, p. 203.

Diagnosis: See key.

Description of subspecies (from Schmidt in Pope, *loc. cit.,* pp. 133-134). Nineteen subequal maxillary teeth, followed by two strongly enlarged ones. Rostral visible from above; internasals as long as broad, their sutures with the rostral subequal to those of rostral and first labial; internasals slightly shorter than the prefrontals; frontal slightly longer than its distance from the rostral, slightly shorter than the parietal suture; parietals truncate behind; frontal wider than the supraoculars; nasal divided; loreal higher than long; eight upper labials, sixth largest, seventh highest, the third, fourth and fifth entering the eye; ten infralabials; a single preocular; postoculars, 2 or 3; temporals, 2 + 2. Dorsal scales in 19 rows at mid-body, 22 on neck, and 17 near tail, narrow, strongly keeled, and notched at tip; outer scalerow smooth; a pair of faint apical pits often difficult to discern; ventrals, 169; tail, incomplete.

Color: General color uniform olive, with reddish markings on the neck, chiefly confined to the skin between the scales; infralabials cream; supralabials gray anteriorly and posteriorly, the middle one lighter, with a black mark on the suture between the fifth and sixth. Ventrals grayish.

Measurements in mm.: Total length, 860; tail 197.8.

Variation: The largest specimen recorded by M. Smith is a female whose total length was 1300 mm., the tail 300 mm. The range of ventrals for the species is from 160 to 180, the subcaudals, 73 to 92.

Remarks: Two specimens of this form No. 25 and 36543 are at hand, the former from an uncertain locality (ventrals 158, subcaudals, 68), the latter from northern Chiang Mai province. Besides the heavy gray dorsal coloration on the outer edge of ventrals a considerable number also have a discrete black spot in this area. The chin is ivory in preservation and all the ventrals have considerable gray pigment on their anterior parts.

Rhabdophis nigrocinctus (Blyth)

(Fig. 61)

Tropidonotus nigrocinctus Blyth, Journ. Asiat. Soc. Bengal, vol. 24, 1856, p. 717 (type-locality, Pegu, Burma); Theobald, Journ. Linnaean Soc., vol. 10, zoology, May 30, 1868, p. 48 (Pegu); Boulenger, Fauna British India . . . Reptilia and Batrachia, 1890, p. 346; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, pp. 255-256; Smith and Kloss, Journ. Nat. Hist. Siam, vol. 1, pt. 3, 1915, p. 244; Smith, *ibid.*, 1916, vol. 2, p. 159.

Rhabdophis nigrocinctus: Wall, Journ. Bombay, Nat. Hist. Soc., vol. 19, 1923, p. 606; Bourret, Les sepents de l'Indochine, 1936, p. 91.

Natrix nigrocinctus: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 4, 1922, p. 206-207; Proc. Zool. Soc. London, ser. B. 1938, p. 579; Bull. Raffles Mus., no. 3, Apr. 1930, p. 44 (Tasan, Tapli, Chumphon); The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 307-308.

Tropidonotus eisenhoferi Gyldenstolpe, Kungl. Sv. Vet. Akad. Hand., Stockholm, Band 3, 55, p. 11, text fig., (type-locality, Muang Fang, N. Siam).

Pseudoxenodon fruhstorferi Werner, Sitz. Ber. Akad. Wiss. Wien, vol. 134, 1925, p. 49 (type-locality, Siam); M. Smith Ann. Mag. Nat. Hist., series 10, vol. 1, 1928, p. 496 (= *nigrocinctus*).

Diagnosis: Scales in 19 rows, with bidentate tips, all keeled. One or two preoculars; nine supralabials; more than 25 maxillary teeth,

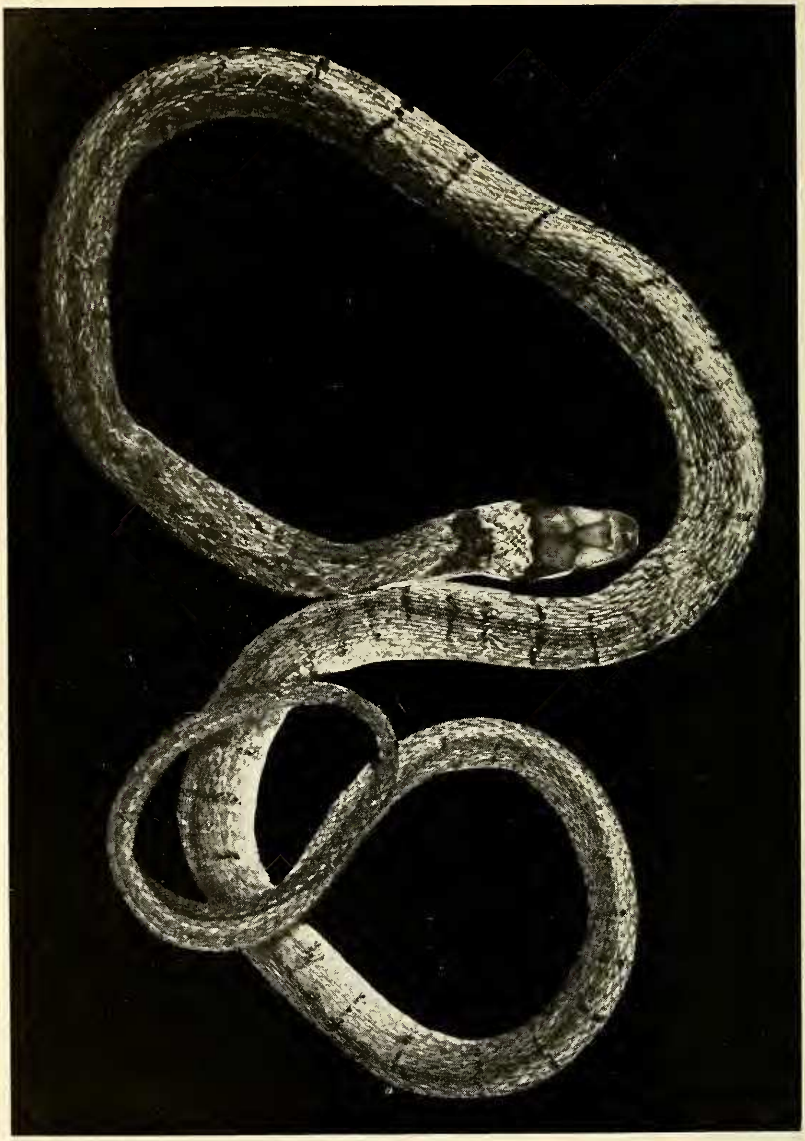

FIG. 61. *Rhabdophis nigrocinctus* (Blyth). No. 21, Doi Suthep, Chiang Mai province. Actual total length, 596 mm.; tail, 159 mm.

last two teeth abruptly much enlarged; internasals broadly truncate anteriorly; nostrils lateral. A nuchal groove and glands present;* one anterior temporal.

Description of species (from No. 21, Doi Suthep, Chiang Mai):

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* In his Key, Smith (p. 248 [1943]), inadvertently places *nigrocinctus* in the section B. "without nuchal glands." On p. 15 he correctly states that the glands are present.

Head distinct from neck. Rostral about twice as wide as high; internasals broadly truncate anteriorly, suture between them slightly shorter than that between prefrontals; latter scales broader than long; frontal five-sided, its length greater than its distance to tip of snout, slightly shorter than parietal; nasal divided, posterior part higher than anterior; loreal longer than high; one preocular, reaching top of skull but separated from frontal; four postoculars; two anterior temporals (the upper divided), three posterior; supralabials, 9-9, fourth, fifth, and sixth enter orbit, seventh and eighth largest; infralabials, 10-10, five touching first chinshields which are somewhat wider but scarcely as long as second pair; latter separated by a scale.

Scale-formula: 22 (occiput), 19, 19, 17, all strongly keeled including outer row. Ventrals, 159; anal, divided; subcaudals, 88.

Five pairs of rounded nuchal glands. Externally there is no distinct groove evident to suggest their presence. Maxillary teeth 28, last eight or ten a little larger than others and after a short diastema followed by two enlarged fangs, without grooves, directed posteriorly.

Color in life: Above olive-green; posterior part of body with a brownish wash. A series of black bars on each side often joining on middle of back. Chin and throat cream-white gradually becoming gray on venter; back part of each ventral whitish without pigment; subcaudals grayish black outlined in white; head blackish brown; supraoculars gray; grayish loreal region; lower edges of anterior labials and whole of posterior labials cream, save for a diagonal black line from eye to mouth, and a larger black spot from parietal to angle of mouth; a light gray band (white in young) crosses occiput behind parietals and angle of mouth; this followed by a deep black chevron-shaped spot.

Measurements in mm.: Total length, 596; tail, 159; width of head, 11.3; length of head, 19.

Variation: Malcolm Smith states that the outer row of scales is usually smooth. The know range of ventrals is from 150 to 170; of subcaudals, 80 to 97.

M. Smith shows that there is some geographical variation in the count of scales on venter and subcaudal regions as follows:

1. Northern Thailand and Pegu—One preocular; ventrals 161-170; subcaudals, 83-96. Adults with distinct cross-bars.
2. Peninsular Thailand—One preocular; ventrals, 150-157; subcaudals, 72-82 marked with distinct black cross-bars.

3. Southeastern Thailand—Two preoculars, ventrals, 156-164; subcaudals 74-84 cross-bars indistinct or absent.

Remarks: This snake is semiaquatic, feeding on frogs and fish.

Distribution: Widespread in Thailand. It has been taken in Chiang Mai, Chumphon, and Chanthaburi. It is also known in Burma, and Indochina. It has not, to my knowledge, been taken in Malaya.

Rhabdophis stolatus (Linnaeus)

(Figs 62, 63)

Coluber stolatus Linnaeus, Systema naturae, 10th Ed., 1758, p. 219; *ibid.*, 12th Ed., 1766, p. 399 (type-locality, "America" = Asia); Anderson, Bih. Sven. Vet. Akad. Handl. Stockholm, vol. 24, (4), 6, 1899, p. 12.

Tropidonotus stolatus: Boie, Isis, 1827, p. 535; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 937; Günther, The reptiles of British India, 1864, p. 266; Theobald, Journ. Linn. Soc., vol. 10, Zoology, no. 41, 1868, p. 47. ("Seasonally head neck and sides are deeply suffused with vermillion").

Tropidonotus stolatus: Tirant, Notes sur les reptiles et batraciens de la Cochinchine et du Cambodge, 1885, p. 56; Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 348-349, fig. 101; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, 1893, pp. 253-254; Wall, Journ. Bombay Nat. Hist. Soc., vol. 16, 1905, p. 302; *ibid.,* vol. 18, 1907-08, pp. 108, 205, 320; *ibid.,* vol. 19, 1909, p. 615; *ibid.,* vol. 20, 1911, p. 603 pl. *ibid.,* 26, 1919, p. 562; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 125-126, fig. 43.

Rhabdophis stolatus: Wall, The snakes of Ceylon, 1921, p. 105; Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 605; Prater, *ibid.,* vol. 30, 1924, p. 168; Fraser, *ibid.,* vol. 39, 1937, p. 469; Bourret, Les serpents de l'Indo-Chine, 1936, p. 92; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1153-1154, fig. 30 (Ban Na Phua, Kan Luang, Nakon Phanom).

Natrix stolata: Pope, The reptiles of China . . . in Natural history of central Asia, vol. 10, 1935, pp. 128-131; Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, pt. 2, p. 24; Shaw, Shebbeare and Barker, Journ. Darjeeling Nat. Hist. Soc., vol. 13, 1939, p. 121; M. Smith, Fauna of British India . . . vol. 3, Serpentes, 1943, pp. 303-305.

Tropidonotus ruficeps Peters, Monatsb. Akad. Wiss. Berlin, 1869, p. 44 (type-locality, "California").

Diagnosis: A natricine snake lacking glands on neck. Last two or three maxillary teeth abruptly enlarged into ungrooved fangs, directed somewhat backwards; internasals narrowed anteriorly; nostrils lateral; scales in 19 rows; two light stripes on back; venter white.

Description of species (From No. 1 ♀, Doi Suthep, Chiang Mai): Rostral about twice as wide as high, well visible above; internasals subtriangular, narrowed anteriorly, less than half size of prefrontals; latter much wider than long, forming their shortest lateral suture with frontal; frontal slender, scarcely wider than supraocular, con-

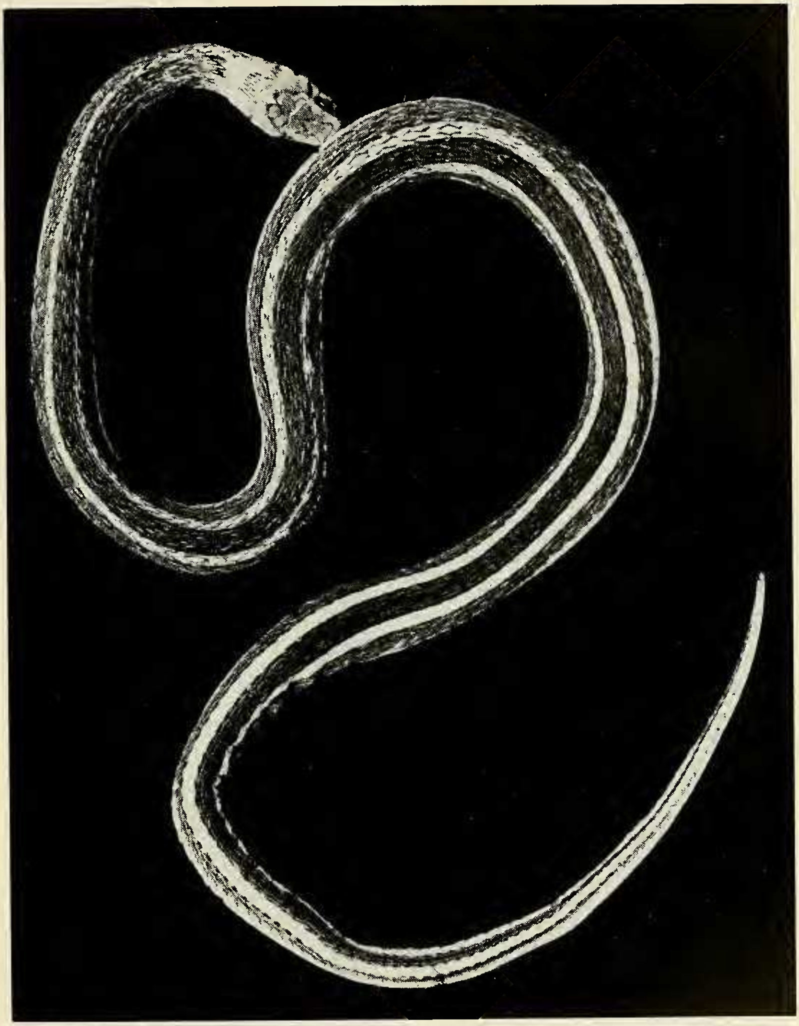

FIG. 62. *Rhabdophis stolata* (Linnaeus), EHT-HMS No. 31761, Ban Na Phua, Na Kae, Nakhon Phanom (province), Thailand. Actual total length, 448 mm. (From Taylor and Elbel.)

siderably longer than its distance from end of snout, approximately as long as parietal; nasal divided, posterior part the larger; loreal a little higher than long; a large preocular reaching top of head, rather narrowly separated from frontal; three postoculars, the temporal touching two lower (or only middle one); temporals, $1 + \frac{2}{1}$; supra-

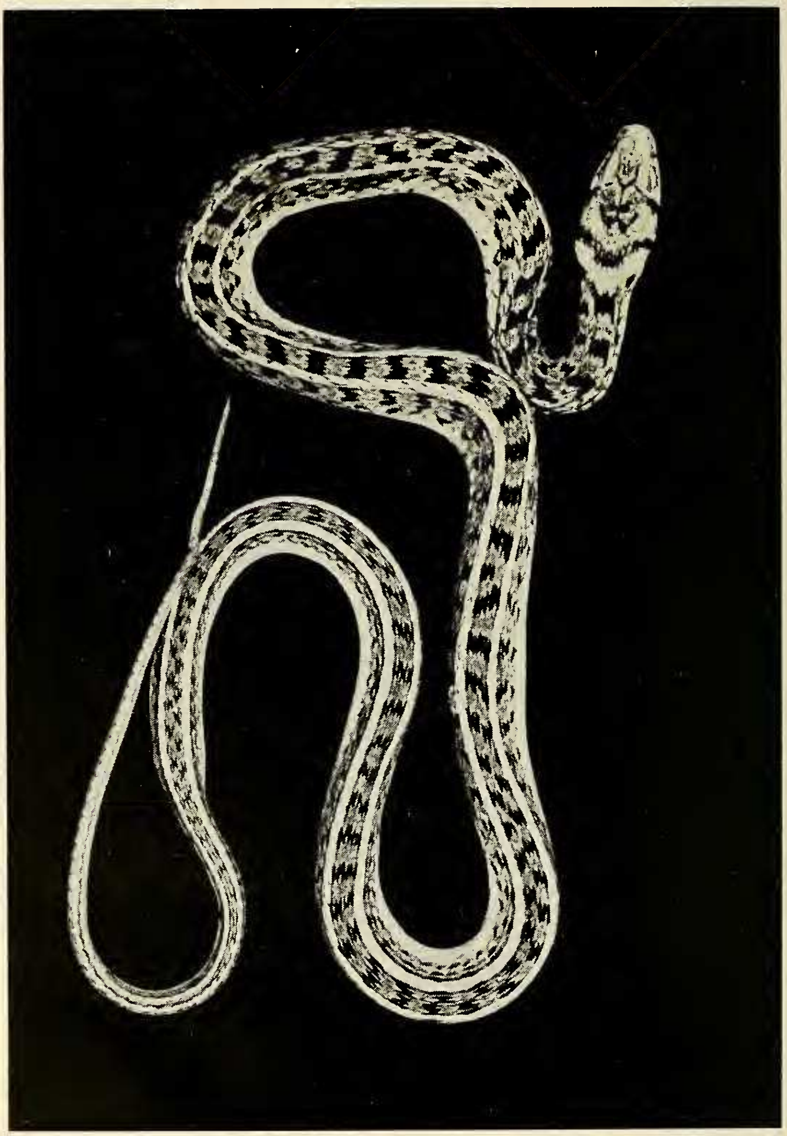

FIG. 63. *Rhabdophis stolatus* (Linnaeus). No. 33179 ♀, near Sara Buri, Sara Buri province. Actual total length, 524 mm.; tail, 131 mm.

labials eight, third, fourth, and fifth entering orbit; seventh largest; infralabials, 10-10, first five bordering first pair of chinshields which are much shorter than posterior; latter separated by small scales.

Scale-formula: 24 (occiput), 19, 19, 17, keeled, except those of outer enlarged row; ventrals, 147½; anal, 2; subcaudals, 35 + (tip of tail missing).

Color in life: Head brownish olive above; supralabials whitish becoming gray posteriorly, sutures blackish as well as upper edge of those labials below eye; two wider black diagonal lines from eye on fifth and sixth labials; spots also on last two labials; light marks on preocular and postoculars bordered by black; chin, infralabials and throat white; body grayish brown with two light dorsolateral stripes, at first not continuous but with small white flecks separated by gray-white; this occupies sixth row and half of two adjoining rows; stripes wider posteriorly only because scales are larger; venter somewhat bluish white; ends of ventrals with some grayish pigment and occasional black spots especially on anterior fourth of body; lower half of outer scalerow whiter than venter forming a ventrolateral stripe; a gray-brown stripe between light stripes on back; those on sides have black spots, distinct anteriorly but posteriorly they are obscured and scarcely distinguishable from ground-color.

Measurements in mm.: Snout to vent, 362; tail, 66 (incomplete); width of head, 11.5; length of head, 18.

Variation: No. 36131 ♂ (from the same locality as the described) specimen yields the following data: head scales identical to described specimen; scalerows reduce to 15 in front of vent; ventrals, 146; subcaudals, 76. This specimen is much lighter on body and the head is also much lighter; snout grayish amber; middle of head across supraorbital region grayish with dark marks on frontal; parietals with some irregular blotches; temporal region and occiput fawn; a black chevron on back of occiput directed backwards, followed by a broader light chevron. The line from eye across first temporal and sixth labial, prominent; black on scales bordering orbit, but sutures are not black; body colored similarly to the one described. No. 33179 (figured) has spoting more distinct.

The specimen figured by Taylor and Elbel shows markings somewhat similar to that last described save that they are less distinct. The ventrals are 144; the subcaudals are incomplete. Smith (1943) gives the range of ventrals as 118 to 158; subcaudals, 50 to 89. The range of the four Thai specimens is 144 ♀ to 147½ ♂ for ventrals; 75 ♀ to 76 ♂ for subcaudals.

Distribution: This subspecies occurs from China through northern (and perhaps southern) Indochina, Thailand north of the peninsula, Burma, Ceylon, and India. It ascends to nearly 2000 M. in the mountains. My Doi Suthep specimens are however from a point with an elevation of only a few hundred feet.

In Thailand it has been reported from the provinces of Chinat, Lopburi, Chiang Mai, Nakon Phanom, and Nakhon Sawan (Paknampho).

Rhabdophis chrysargus (Schlegel)

(Fig. 64)

Tropidonotus chrysargus Boie, Isis, 1827, p. 534 (type-locality, Java) *nomen nudum;* Schlegel, Essai sur la physionomie des sepents, vol. 2, 1837, p. 312, pl. 12, figs. 6, 7; Boulenger, The fauna of British India, Ceylon and Burma Reptilia and Batrachia, 1890, pp. 345-346 (*part.*); Catalogue of the snakes in the British Museum, 2nd Ed., vol. 1, pp. 258-269; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 127-128; Fasciculi Malayenses, Zoology, vol. 1, 1903, p. 161; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914-1915, pp. 130, 155, 213; Smith and Kloss, *ibid.*, vol. 1, no. 4, Dec. 1915, p. 244 (Klong Menao, Trad).

Natrix chrysarga: M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 308-309; Journ. Federated Malay States Mus., 1922, p. 265; Bull. Raffles Mus., no. 3, 1930, p. 44; Tweedie, The snakes of Malaya, 1954, pp. 65-66; figs. 15 a, b.

Rhabdophis chrysargus: Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 606 (*part.*); Angel, Bull. Mus. Nat. Hist. Paris, ser. 2, vol. 1, 1929, p. 76.

Tropidonotus junceus: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, pt. 2, pp. 93 (reprint?); Girard, U. S. Exploring Expedition . . . 1858, p. 145, pl. 13, fig. 1.

Tropidonotus chrysargus: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2 (*part.*) Dec. 1916, Maprit, Klong Bang Lai, Prachuap Khiri Khan; Khao Wang Hip, Nakhon Si Thammarat).

Diagnosis: A relatively small water snake (total length to 715 mm.). Maxillary teeth, 27-35, curved backwards rather strongly, the last two strongly and abrupted enlarged; nine supralabials; temporals, 2 + 2. Scales in 19 rows, all keeled except anterior part of outer scalerow; relatively low number of ventrals, (155-165); subcaudals, 80 to 101. A whitish color edged with black; labials cream or yellow with black sutures and a cream line running up from mouth angle; dorsolateral series of lighter spots (whitish or pinkish) with small blackish spots on each side; the black color may form a line across dorsum. Light spots absent on anterior fifth of body; outer part of ventrals with double rows of small black spots and a median ventral row also present.

Description of species (from No. 35874 ♀): Rostral about one and one-third times as wide as high, narrowly visible above; internasals narrowed but little anteriorly, as long as prefrontals; latter wider than long, slightly notched on their anterior faces by the

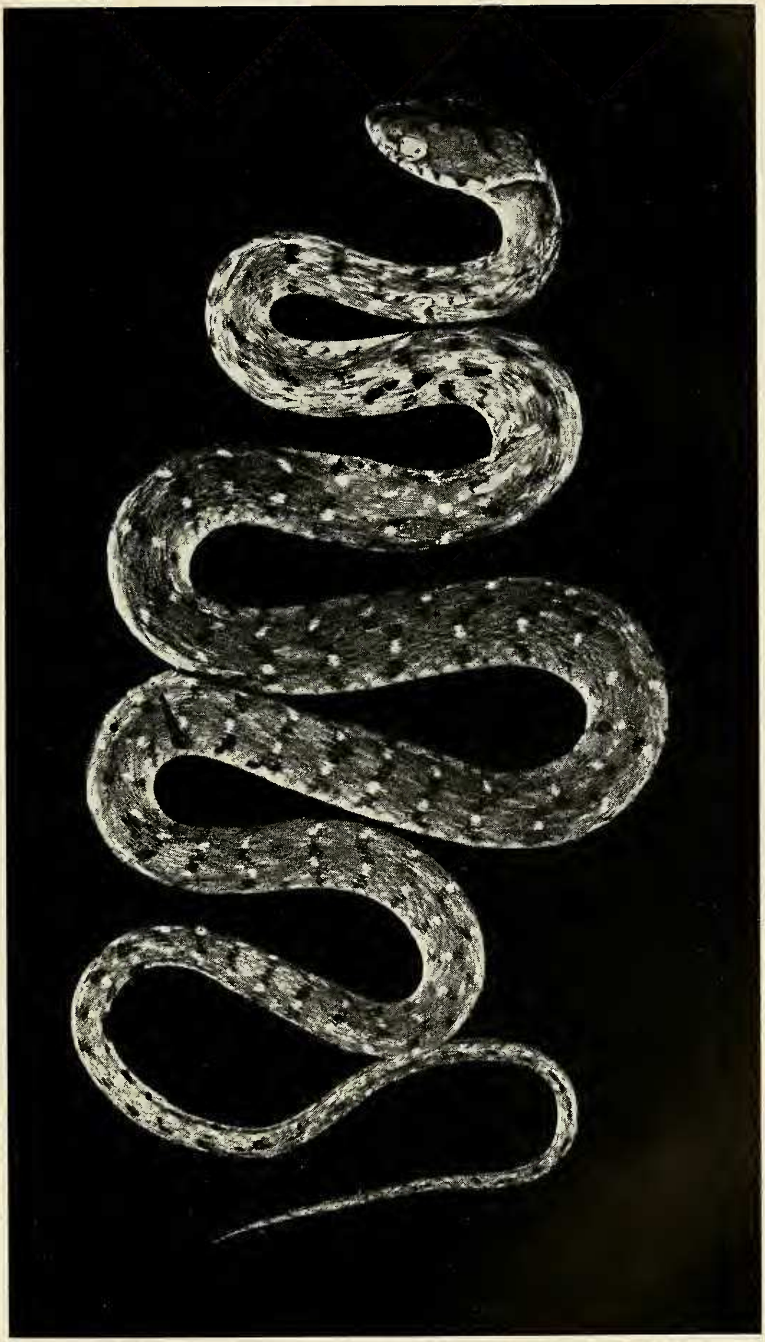

FIG. 64. *Rhabdophis chrysargus* (Schlegel). No. 35874 ♀, Forest Experimental Station, Khao Chong, Trang province, southern Thailand. Actual total length, 637 mm.; tail, 160 mm.

internasals; frontal wider than supraoculars, about one and one-fourth times as long as wide, a fourth longer than its distance from end of snout, a little shorter than parietals; nasal more or less completely divided, anterior part a little the larger; loreal a little longer than high; one preocular reaching upper surface of head; three postoculars; temporals, $2+1+2$, $(2+3)$; supralabials, 9-9, fourth, fifth, and sixth border orbit, eighth largest; infralabials, 10-10, first five border first chinshields which are shorter than second pair; latter separated by scales; eye large, as long as its distance from rostral.

Scale formula: 24 (occiput), 19, 19, 17, scales keeled except anterior part of outer row. Ventrals, 153; subcaudals, 80; two anals. Maxillary teeth 28, last two on each side enlarged.

Color: Head blackish olive, as is occiput and nape; supralabials cream, the sutures black; white lines from angles of mouth run backwards and upwards to form a white chevron pointing backwards, bisecting the black area on nape; behind black area anterior fifth of body brownish, skin between scales pinkish; a series of small black spots forming an incomplete reticulum, the spots across middle largest; a series of light spots on each side of latter four fifths of body that are more or less surrounded by darker color and often connected by a narrow black line or band across middle of back; tail similarly but indistinctly marked. Chin and throat white, neck and first fifth of venter pinkish ivory with dots on outer ends of ventrals; beginning in second fifth the outer edges of ventrals dark gray, with a black dot usually present; a median line of dark dots continues to vent; other fine pigment scattered posteriorly; subcaudal region with two rows of dark spots and much scattered pigment.

Measurements in mm.: Total length, 637; tail, 160; width of head, 11.5; length of head, 19.5.

Variation: The details of coloration vary somewhat with age. The white chevron on the nape may disappear in older specimens; and the blackish color on head and neck may likewise tend to disappear. No. 3479, Na Pradoo lacks the chevron.

Variation in the ventral count is from 153 to 165; in the subcaudals, 80 to 101.

Distribution: In Thailand the species occurs from the southern peninsular border to Chiang Mai in the north. Outside of Thailand the species is known in Cambodia and Tenasserim, Malaya and the larger East Indian Islands.

Remarks: The described specimen is from Khao Chong, Trang.

Subfamily BOIGINAE

KEY TO GENERA * SUBFAMILY BOIGINAE

1. Median maxillary teeth not larger than the remainder of series preceding the posterior fangs 2
   Median maxillary teeth (3rd and 4th or 4th and 5th) distinctly enlarged, usually followed by a diastema 3
2. Maxillary teeth ten to fourteen, subequal in size followed after a short diastema by two much-enlarged grooved fangs; arboreal serpents, one to two and one-half meters in length .... *Boiga*
   Maxillary teeth 20-22, last three or four a little larger and grooved; ventrals sharply angulate; slender arboreal snakes reaching a length of little more than one meter .... *Chrysopelea*
3. Body slender, elongate, compressed; snout terminating in a sharp point or with a pointed dermal projection; maxillary teeth, 12-15, the anterior six or seven rapidly increasing in size followed by a diastema, then eight smaller teeth preceding two enlarged grooved fangs .... *Dryophis*
   Body not especially slender or elongate, the snout not pointed 4
4. Anal single; pupil vertically elliptic; ten to twelve maxillary teeth, the fourth and fifth strongly enlarged .... *Psammodynastes*
   Anal divided; pupil round; median maxillary teeth feebly enlarged, *Psammophis*

* Key characters apply at least to Thai species.

Genus *Boiga* Fitzinger

Boiga Fitzinger, Neue Classification, Reptiles, 1826, pp. 29, 31, 60 (type of genus, *Coluber irregularis* Merrem): Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 264.

Eudipsas Fitzinger, Systema reptilium, 1943, p. 27 (type of genus, *dendrophila.*

Dipsas Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 357.

Dipsadomorphus Fitzinger, Systema reptilium, 1843, p. 27 (type of genus *D. drapiezii*); Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 59.

Diagnosis: Maxillary teeth from 9 to 14, followed after a short interval by two or three enlarged grooved fangs; anterior mandibular teeth much enlarged or anterior teeth nearly equal in size to posterior. Head strongly distinct from neck; body strongly compressed; eye large, pupil vertical. Hypapophyses usually developed posteriorly on vertebrae. Scales smooth with apical pits, 17 to 31, scalerows transversely oblique; subcaudals divided; nasal single or at most partially divided, posterior part concave; ventrals angulate laterally.

Of the seven species of *Boiga* known to occur in Thailand only three have a wide distribution in the country. The smallest one, *multomaculata* * reaches as far north as China, and has been taken in Chiang Mai, Loei and Chon Buri provinces and on certain islands in the Gulf of Siam. Strangely enough it has not been taken in southern Thailand, Malaya, or Singapore, but it does occur in Java, Sumatra, and Borneo.

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* Spelled so by Boie (1827).

Boiga cynaea, the green cat snake, has a range extending from Darjeeling and Assam south through Burma, Thailand, Cambodia, and the island of Koh Pu-Ngan in the Gulf of Siam. It appears to be unknown in southern Thailand, Malaya and the islands to the south.

Boiga cynodon, which has two forms, usually regarded only as color varieties, covers the western part of Thailand from Loei province south to Trang. It is known in Malaya, Singapore and the Indo-Australian archipelago. Four other species *drapiezii, nigriceps, jaspidea,* and *dendrophila* enter Thailand from the south and it is doubtful that they are to be found north of the Nakhon Si Thammarat mountains. The dark "color variety" of *cynodon* has been taken only in the southern province of Pattani.

Boiga hexagonotus has been reported from Thailand, but this would appear to be the result of some metathesis of data. This nominal species is a synonym of *Boiga achracea,* an Indian species.

KEY TO THAI SPECIES OF *Boiga*

1. Scalerows at middle of body, 19 (rarely 17).......................... 2
   Scalerows 21 or more than 21 at middle of body.......................... 3
2. A pair of black stripes on venter; subcaudals 114-169; eye as long as snout. Large species reaching two meters in length.................. *drapiezii*
   No stripes; venter whitish, marbled and spotted with brown, and a series of brown spots along each side; subcaudals, 80-106; small species one meter or less in length.................................. *multomaculata*
3. Scalerows 21.. 4
   Scalerows 23-25.. 7
4. Uniform green, the interstitial skin black; young greenish or grayish with indefinite darker pattern; subcaudals, 124-138; temporals usually, 2 + 3. Large species, to one-and-three-fourths meters.................. *cyanea*
   Adults not green.. 5
5. Body deep black with yellow vertical bars on sides of body and tail; snout longer than eye; subcaudals, 89-110.................. *d. melanota*
   Body not so colored.. 6
6. Head blackish; body reddish or pale grayish brown uniform or mottled; upper lip and venter yellowish white........................ *nigriceps*
   Head shields with discrete, more or less symmetrical light-edged black spots; a ventrolateral series of white spots, two or three scales in area, partly on ventrals. Body light brown or reddish brown, mottled or speckled with brown or black and with blackish cross-bands interrupted on the median line. Large species (to two meters).................. *jaspidea*
7. Uniform fawn with black chevron-shaped marks enclosing lighter marks on middorsal line; a series of whitish marks on outer scalerows; head nearly uniform fawn with a well-defined dark black stripe behind eye; anterior mandibular teeth much enlarged. Large snakes (to two meters or more), *cynodon*
   Generally grayish black with darker blackish blotches separated in the adults by dark grayish areas; a dark black stripe behind eye; anterior mandibular teeth enlarged. Large snakes (to two meters)...*cynodon* var

These snakes are arboreal for the most part and feed on a variety of foods, such as birds, snakes, mammals, frogs, fish, etc. I have found *multomaculata* in a small shrub tightly coiled about a small branch, and another specimen under a rock near the edge of a small pool. *Dendrophila* is perhaps somewhat aquatic as they are almost invariably found in the vicinity of streams or along coastlines where there are mangrove swamps. They often bask in the trees near the edge of streams and occasionally three or four may be seen in a single tree. If disturbed they may take a dive into the water and swim below the surface until they reach shore, or they may take temporary refuge under some submerged object. They are reputed to eat fish almost exclusively.

Boiga drapiezii (Boie)

Dipsas Drapiezii Boie, Isis, 1827, p. 559 (type-locality, Java); Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 270, pl. 9, figs. 8, 9; Abbildungen . . . 1840, p. 48, pl. 15; Günther, Ann. Mag. Nat. Hist., ser. 3, vol. 9, 1862, p. 53.

Triglyphodon Drapiezii Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, pt. 2, 1854, pp. 1097-1101.

Dipsadomorphus drapiezii Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 74-75; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 171; M. Smith, Bull. Raffles Mus., no. 3, Apr., 1930, p. 64; Sworder(Singapore Nat., no. 2, 1922, p. 66 (Singapore).

Boiga drapiezii Tweedie, Bull. Raffles Mus., no. 23, Dec., 1950, pp. 196-197 (Selangor, Malaya); *ibid.*, no. 25, Dec., 1954, pp. 113-115, fig. 2 (Johore, Perak, Pahang, Selangor, North Natuna Islands).

Diagnosis: A large species reaching a length of more than two meters; a large preocular reaching top of head, often to frontal; 19 scalerows, the vertebral row enlarged; a pair of black lines on venter.

Description of species (from C.U. No. 2622, Na Pradoo, Pattani): Head very distinct from neck; body compressed. Rostral wider than high, barely visible above; internasals broader than long, narrowed to a small angle laterally; prefrontals much wider than long, extending down on sides of head to level of middle of eye, their common suture distinctly longer than that between internasals; frontal longer than wide (5 × 3.2 mm.), the sides emarginate, its length greater than its distance from tip of snout, shorter than parietals; supraocular as long but not as wide as frontal; nostril in a partially divided nasal, posterior part largest and somewhat concave behind nostril; loreal small, as wide as high; a preocular reaching upper surface of head but narrowly separated from frontal; two postoculars, upper largest; temporals, $3 + \frac{1}{2 + 2}$; eye very large, its diameter distinctly greater than length of snout; pupil vertical; eight supralabials, 3rd to 5th bordering orbit; mental about as wide as base of rostral; eleven infralabials, first six border first chinshields which are a little larger than second pair, neither pair separated; scales smooth, with apical pits.

Scale-formula: 25 (occiput), 19, 19, 13; transverse rows diagonal; median dorsal row not strongly widened anteriorly, wider posteriorly. Ventrals, 279; anal, single; subcaudals (divided), 168; ventrals and subcaudals obtusely angulate laterally.

Color: Pale fawn, head nearly unicolor; no dark line behind eye; supralabials below eye nearly white; chin and throat white except for some pigment on three anterior infralabials and mental; a series of dark dorsal blotches, slightly diagonal, each blotch with a transverse black line in its middle; edges of blotches darker extending down on sides to first or second scalerow; on first and second scalerows a series of white spots usually covering two scales; these may touch dark blotches or the intervening lighter fawn color. On tail, blotches proportionally longer; intervening light areas very small; venter nearly white with some fine scattered pigment increasing somewhat, posteriorly and becoming dense under posterior part of subcaudal region. A black dashlike spot on outer part of each ventral which together form two black stripes extending to vent level. Anteriorly dots separated a little, and if they occur on tail they are very indistinct.

Measurements in mm.: Total length, 524; tail, 136; width of head, 8.5; length of head, 11.2.

Distribution: I have seen only a single Thai specimen—this from the province of Pattani. It has been reported as occurring in Malaya in the following states: Malacca, Kelantan, Pahang, and Selangor. It also occurs in Singapore, Sumatra, Borneo, Java, and Amboina.

Variation: The range of ventrals is from 250 to 279; of subcaudals from 114 to 168. The loreal is sometimes absent, and the preocular may reach the frontal. The temporals may be 3 + 3 + 3 or 2 + 2 + 3. Occasionally the third supralabial may be excluded from the orbit.

Remarks: The species may, according to Tweedie (*loc. cit.*), reach a length of seven feet. The specimen here described is a juvenile collected at Bukit Besar by Nai Pryoon Kananuracks of Na Pradoo, Pattani.

Tweedie, Dec., 1954, has reported the species from Kelantan northern Malaya. He further distinguishes two color patterns in the species, neither of which fits the description here given.

Boiga multomaculata (Boie)

(Fig. 65)

Dipsas multomaculata Boie, *in* Boie, Isis, 1827, p. 549 (type-locality, Java); Russell, Indian serpents, 1801, vol. 2, p. 27, pl. 23 (Java).

Dipsas multimaculata: Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 265, pl. 11, figs. 4, 5; Abbildungen neuer oder unvollständig bekannter Amphibien . . . 1844, pl. 14, figs. 13-15; Boulenger, The fauna of British India, Ceylon and Burma; Reptilia and Batrachia, 1890, p. 360; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 923; Günther, The reptiles of British India, 1864, pp. 311-312.

Dipsadomorphus multimaculatus: Boulenger, Catalogue of the snakes of the British Museum, 2nd Ed., vol. 3, 1896, pp. 63-64; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 346; 1901, p. 615; Wall, Journ. Bombay Nat. Hist. Soc., vol. 13, 1901, p. 534; *ibid.*, vol. 29, 1924, p. 869; *ibid.*, vol. 30, 1925, p. 818; *ibid.*, vol. 31, 1925, p. 564; Prater, Journ. Bombay Nat. Hist. Soc., vol. 38, 1935, p. 201; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 168-169.

Boiga multimaculata: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, p. 203; Pope, The reptiles of China, 1935, pp. 330-331, pl. 15, D-I; Bourret, Les serpents de l'Indochine, 1936, p. 311; M. Smith, The fauna of British India, Ceylon and Burma; Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 347-348; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1142-1143.

Boiga multimaculata hainanensis Mell, Lingnan Sci. Journ., vol. 8, 1929, p. 213 (type-locality, Hainan).

Boiga multimaculata indica Mell, Lingnan, Sci. Journ., vol. 8, 1929, p. 213 (type-locality, Continental India).

Diagnosis: Relatively small species of the genus, approximately one meter in length; body slender, compressed. Maxillary teeth, 9(10) + 2. Scalerows: 19, 19, 15; preocular not reaching top of head. Gray above with two series of dark, light-edged spots on dorsum and two irregular series on sides; venter cream, heavily clouded or spotted with light brown; a short line behind eye.

Description of species (from No. 33490, Ang Hin, Chon Buri province): Head strongly distinct from neck; rostral distinctly wider than high, only a very narrow portion of it visible from above; internasals as long as broad, as long as prefrontals but narrower; prefrontals much wider than long; frontal very short, as wide as long, its length about equal to its distance from rostral, shorter than parietals; nostril between two nasals, posterior one somewhat concave; loreal present, about as long as high; preocular relatively

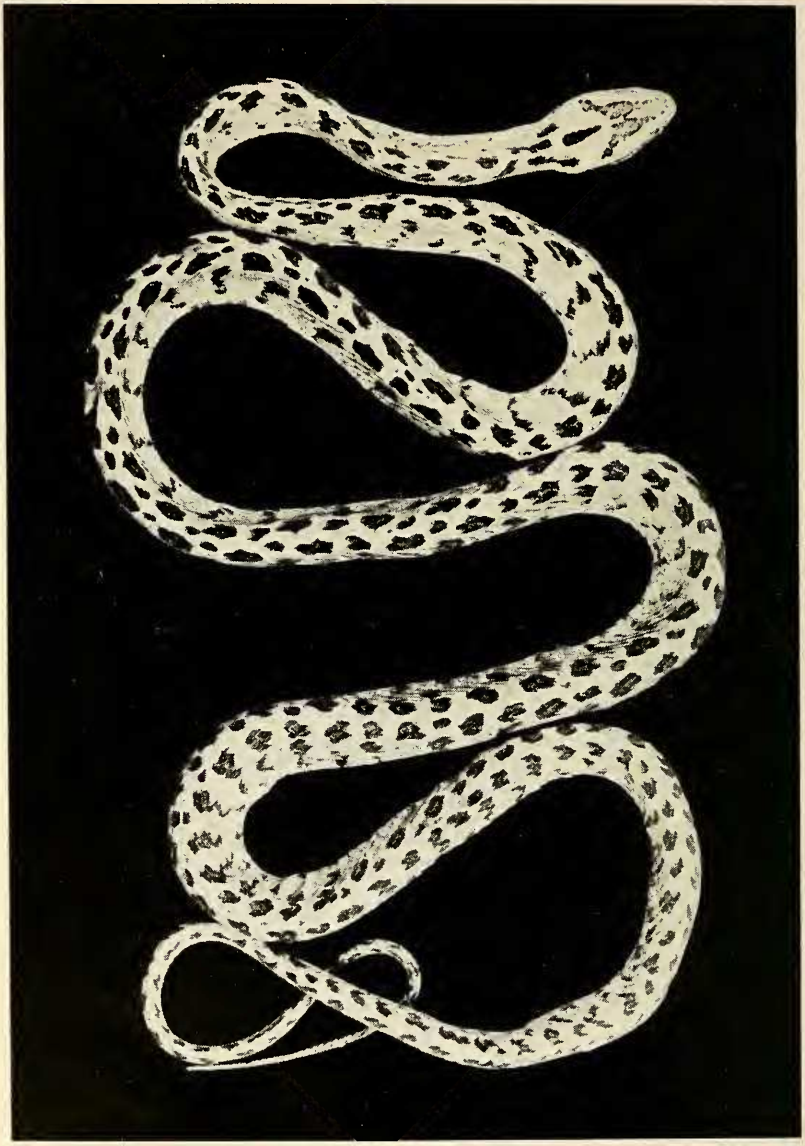

FIG. 65. *Boiga multomaculata* (Boie). No. 3♀, Forestry Station, Doi Suthep, 1000 m., Chiang Mai province. Actual total length, 801 mm.; tail, 161 mm.

small not reaching top of head; two postoculars; temporals (normally), 2 + 3 + 3, the front part of upper anterior one broken into two small portions; supralabials eight, third, fourth, and fifth border orbit; eye large, pupil vertical; infralabials eleven, five bordering anterior chinshields which are nearly double size of second pair; latter separated by small scales.

Scale-formula: 27 (occiput), 19, 19, 15, the scales smooth, somewhat diagonal, each with a single apical pit. Ventrals, 235; anal, single; subcaudals, 95; ventrals not or but very obtusely keeled.

Color in life: Brownish gray above with a more or less paired series of large brown spots, darker on their periphery, at least partially, with a narrow creamy-white border; on sides a series of irregular spots or blotches usually alternating with dorsal spots; below another irregular series of smaller spots or flecks; an irregular series of brown spots on outer edge of ventrals, visible laterally; head gray with a brown stripe beginning somewhat behind parietals and running forward, meeting its fellow on frontal; an oval dark spot on occiput; a narrow line from eye across angle of mouth; small indefinite brown flecks on supralabials which are cream on their lower edges; infralabials cream, each with a small brown spot; chin and beginning of throat cream-white; venter brownish gray, spotted or clouded with brown spots or flecks.

Measurements in mm.: Total length, 773; snout to vent, 621; tail, 152; width of head, 11; length of head, 18.

Table of data on Boiga multomaculata

NUMBER	33490 ♀ *	33416 ♀	33229 yg.
Total length	773	801	332
Tail	152	147	72
Head length	18	20	11.5
Head width	11	13.5	8
Ventrals	235	241	229
Subcaudals	95	98	104
Supralabials	8	7–8	8
Infralabials	11	9–9	10 (–11)

* 33490, 33229, Ang Hin, Chon Buri; 33416 Phu Kading (Mt.) Loei province.

Variation: No. 33416 ♀ is a specimen collected on Phu Kading (plateau) by Dr. Kloom Vajropala at an elevation of 4000 feet. The specimen is anomalous in that there is remarkable fusion of the head scales. The internasals are fused into a single scale, the left supraocular and parietal are partially fused on one side, the upper preocular and supraocular are fused on the other; the second, third, fourth, and fifth supralabials on the right are completely or partially fused into one scale; on the left side the second and third are partially fused, the third excluded from the border of the orbit. The scale-formula: 31 (occiput), 17, 17, 13.

The vertebral scalerow is distinctly enlarged, and the posterior border usually has a small emargination. The spots on head do not join together, and they terminate on the parietals. The occipital oval spot is present, flanked by two smaller diagonal spots. The infralabials usually have several brown flecks rather than a single discrete spot. The maxillary teeth in the two larger specimens number 9 + 2.

Distribution: In Thailand I have collected the species in Chiang Mai (Doi Suthep, 1000 m.); and at Ang Hin, Chon Buri province at near sea-level. One anomalous specimen has been taken on Phu Kading 1210 m. Loei province. Other specimens have been reported from certain islands in the Gulf of Siam. It is also known in Burma, Assam, Indo-China, southern China, Hainan, Java, Sumatra and Borneo.

Boiga cyanea Duméril, Bibron, and Duméril

(Fig. 66)

Triglyphodon cyaneum Duméril, Bibron and Duméril, Erpétologie générale, vol. 7, pt. 2, 1854, pp. 1079-1080 (type-locality, not given).

Dipsas cyanea: Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, pp. 361-362; Evans Journ. Bombay Nat. Hist. Soc., vol. 13, 1901, p. 553; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 188.

Dipsadomorphus cyaneus: Boulenger, Catalogue of the snakes in British Mus., vol. 3, 1896, p. 72 (*part.*); Evans, Journ. Bombay Nat. Hist. Soc., vol. 16, 1904, p. 170; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 329; *ibid.*, vol. 19, 1909, p. 353; Rec. Ind. Mus., vol. 3, 1909, p. 154; Smith and Kloss, Journ. Nat. Hist. Soc. Siam, vol. 1, 1915, p. 246.

Boiga cyanea: Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1924, p. 873; M. Smith, Bull. Raffles Mus., no. 3, 1930, pp. 64-65; Bourret, Les serpents de l'Indochine, vol. 2, 1936, p. 317; Smith, The fauna of British India, Ceylon and Burma; Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 355-356; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, Mar. 20, 1958, pp. 1143-1145, fig. 28.

Diagnosis: Scalerows normally, 21, 21, 15; vertebral scales somewhat enlarged; body compressed; adults nearly uniform green above; yellowish cream on venter and subcaudal region. Anterior palatine teeth scarcely larger than posterior; anterior mandibular teeth much larger than posterior.

Description of species (from No. 34887, environs of Ubon, Ubon province): Rostral a little wider than high, only a very small por-

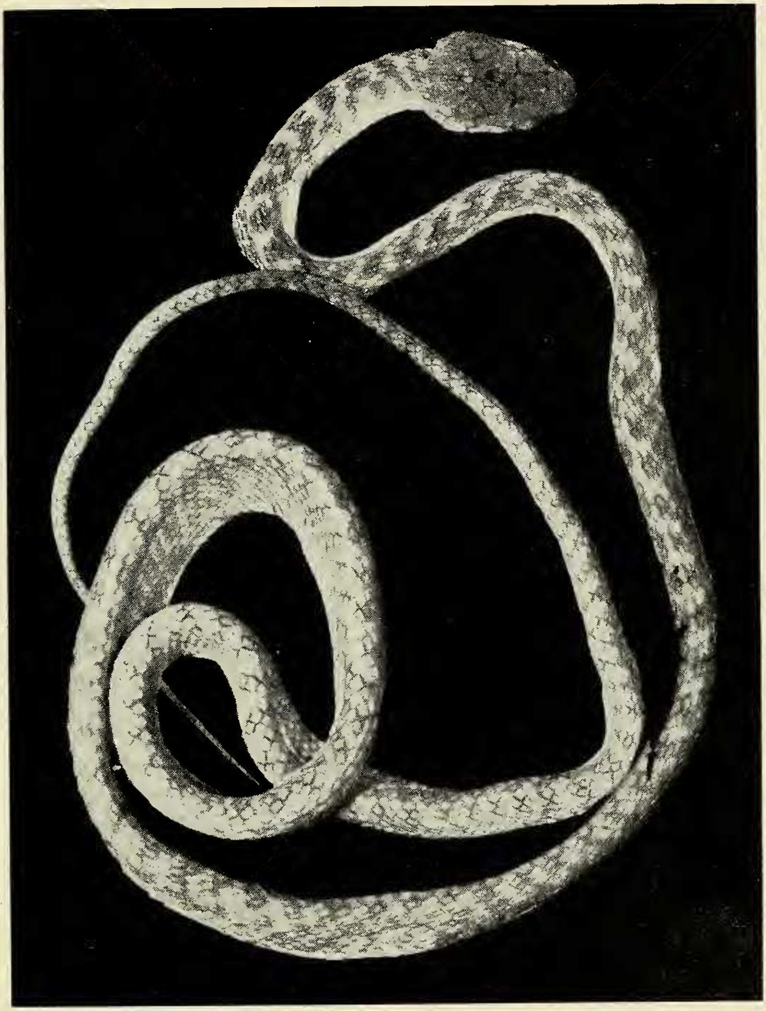

FIG. 66. *Boiga cyanea* Duméril, Bibron and Duméril. EHT-HMS No. 31826, Lomlo Mt. 2100 m. elev., Loei Ban Maeo, Ko Sathon, Dansai, Loei, Thailand. (Young.) Actual total length, 700 mm.; tail, 161 mm. (From Taylor and Elbel.)

tion visible above; internasals distinctly wider than long; prefrontals wider than long, their common suture longer than that between internasals; frontal shorter than its distance from tip of snout, shorter than parietals; nostril between two nasals, anterior the larger; loreal a little longer than high; preocular large, reaching top of head but separated from frontal; two postoculars; temporals, 2 + 3 + 3; supralabials nine, third, fourth, and fifth bordering orbit; infralabials, 11-12, five touching first chinshields which are broader, but a little shorter, than second pair; latter separated by small scales. Scale-formula: 28 (occiput), 21, 21, 15. Scales smooth in somewhat diagonal transverse rows with a single apical pit in dorsal scales; body scales somewhat pointed behind; vertebral scalerow enlarged, the scales truncate behind. Ventrals, 249; anal, single; subcaudals, 125. Lateral keel on ventrals indistinct. Pupil vertical.

Color in life: Above uniform green; below, on venter and in subcaudal region, yellowish cream; bluish or bluish-white on chin. In preservative nearly ultramarine below, edges of scales lighter.

Measurements in mm. (measurements taken on the described specimen are no longer available): The species is known to reach a length of 1869 mm. (*fide* M. Smith). A specimen reported by Taylor and Elbel (*loc. cit.*) has a total length of 1558, the tail, 311 mm.

Variation: The ventrals are known to vary from 237 to 257; subcaudals, 144 to 158.

Distribution: In Thailand the species is known from Nakhon Lampang; Loei (Ban No Muang, elev. 1780 m., Na Haeo, Phu Lom Lo, elev. 2100 m.). A specimen has been taken on Koh Pa-Ngan (island) and one at Klong Menao in Trad province, southeastern Thailand.

Remarks: The specimen described was taken from a cavity in a tree limb about two meters above ground. It made no effort to bite when captured or when handled later. Taylor and Elbel (*loc. cit.*) figure a specimen showing the juvenile coloration pattern, all or almost all of which is lost in the adult. The color in life of the adult is a lively emerald- or yellow-green which tends to become bluish green or bluish in preservative.

Boiga dendrophila (Boie)

Boiga dendrophila Boie, Isis, vol. 20, 1827, p. 549 (type-locality, Java).

Boiga dendrophila dendrophila: Brongersma, Zool. Meded, Deel, 17, 1934, pp. 205-207.

Brongersma has reviewed this species, (*loc. cit.*) and has recognized eight subspecies, only one of which is known to occur in Thailand. The species has a wide range, from Luzon in the Philippines, to southern Thailand.

Boiga dendrophila melanota (Boulenger)

(Fig. 67)

Triglyphodon melanotus Bleeker, (museum labels).

Triglyphodon dendrophilum var. C. Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, pt. 2, 1854, p. 1090 (type-locality, Sumatra).

Dipsas dendrophila: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 923 (Catalogue of the reptiles of the Malay Peninsula, 1847, p. 76); Blanford, Proc. Zool. Soc. London, 1881, p. 215.

Dipsadomorphus dendrophilus var. *melanotus* Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, pp. 70-71 (type-locality, "East Coast of Sumatra"). Brongersma,* Contributions to Indo-Australian Herpetology, 1934, pl. 1, figs. 4, 9; pl. 1, figs. 8, 9.

Dipsadomorphus dendrophilus: Flower, Proc. Zool. Soc. London, 1896, p. 889; *ibid.*, 1899, pp. 601, 606 (*part.*); de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, 1917, p. 197 (*part.*). Brongersma and Wehlberg, Misc. Zool. Sumatra, vol. 79, 1933, p. 4.

Boiga dendrophila Barbour, Mem. Mus. Comp. Zool. Harvard Coll., vol. 44, 1912, p. 125 (*part.*); M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 65. Sworder, Singapore Nat., no. 2, 1922, p. 66.

Diagnosis: Large snake reaching a length of from two to two and one-half meters; deep black with yellow lateral bars extending to venter but not crossing it; labials yellow, edged with black; bars of yellow on body, 23-29, not meeting on mid-line; ventrals, 202-231; subcaudals, 93-109. Maxillary teeth largest, followed by two grooved fangs, anterior teeth largest; 21-23 scalerows around middle of body. Preocular reaching top of head but not touching frontal.

Description of species (from No. 34831, near Phatthalung, Phatthalung Province, Thailand): Head very distinct from neck; snout longer than diameter of eye; rostral as high as wide, narrowly visible above; internasals considerably smaller than prefrontals, laterally separated from loreal; prefrontals wider than long, touching nasal, loreal, and preocular laterally; frontal short, shield-shaped, shorter than its distance from tip of snout, shorter than parietals; supraoculars subtriangular; parietals as broad as long; nasal divided, posterior portion rather concave and bearing nostril; loreal longer than high; preocular narrowly separated from frontal; two small postoculars; temporals, 3 + 3 (2 + 3) second series not regular; supralabials, 8-8, third, fourth, and fifth border orbit; sixth and seventh largest; infralabial, 11-11, five touching first chinshields which are larger than second; latter scales triangular, touching only at a point, but touching labials throughout their length. Body compressed.

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* The type locality "Sumatra" is restricted by Brongersma, 1934, *loc. cit.*, to "the east coast of Sumatra."

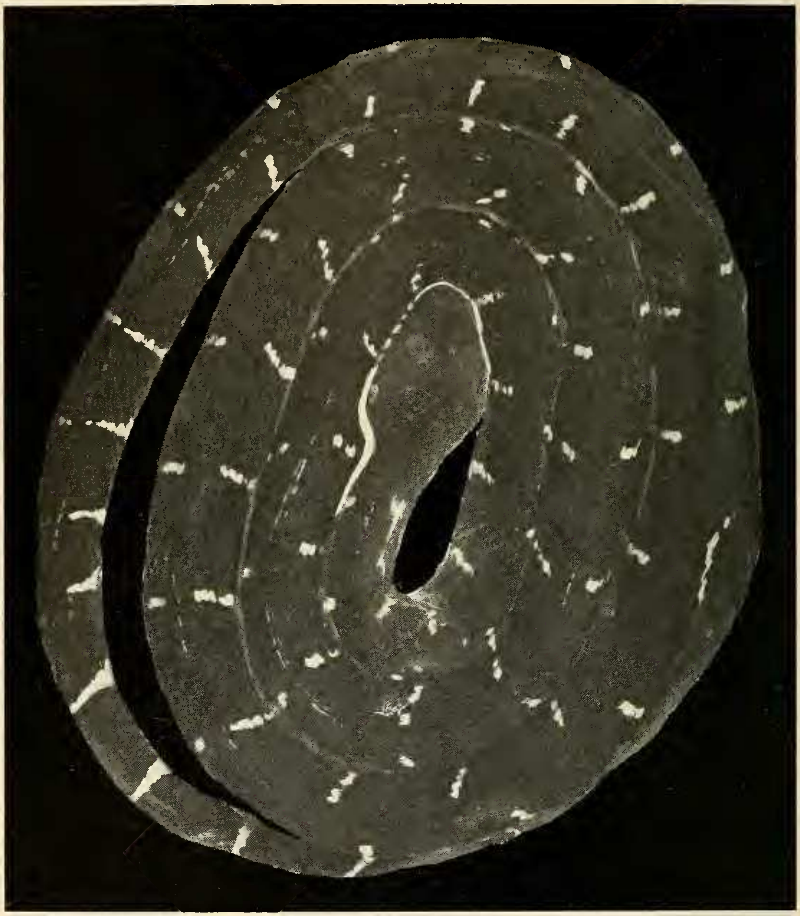

FIG. 67. *Boiga dendrophila melanota* (Boulenger). No. 34828, 6 km. east, Phatthalung, Phatthalung province, Southern Thailand. Actual total length, 1795 mm.; tail, 374 mm.

Scale-formula: 26, 23, 21, 15; scales smooth, with two apical pits; vertebrals enlarged; scales arranged in diagonal transverse rows. Ventrals, 218; subcaudals, 99; anal, single. Ventrals somewhat angulate.

Color in life: Deep black or blue-black with narrow bright yellow bands mostly confined to sides, reaching venter, where they widen but do not cross. Head black above; labials yellow with black sutures; chin and front part of throat yellow; first yellow band covering outer parts of three ventrals, and farther back covering rarely more than outer part of one ventral, extending on scale for a third of its width. Subcaudal bands widen on venter often completely crossing subcaudal region.

Measurements in mm.: Total length, 1308; tail, 258; width of head, 29; length of head, 37.

Variation: Ventrals vary between 209 and 239; the subcaudals, 89-110. Occasionally nine supralabials are present instead of eight.

Distribution: In Thailand the species has been taken in Pattani, Phatthalung, Trang, Narathiwat, and Nakhon Si Thammarat provinces, all in the southern part of peninsular Thailand.

Remarks: I have followed Dr. Brongersma's (*loc. cit.*) arrangement of the subspecific forms of this species. He regards this form as being confined to the peninsula and the coast of Sumatra. The species itself has a wide distribution also in the Indo-Australian Archipelago and the Philippines.

The serpents were usually found in trees that overhung streams. At Phatthalung I captured three from a single tree. When first disturbed they slid into the water, swam under its surface for some distance but reappeared later on the opposite bank.

Boiga nigriceps (Günther)

Dipsas nigriceps Günther, Ann. Mag. Nat. Hist., ser. 3, vol. 12, 1863, p. 359 (type-locality unknown).

Dipsadomorphus nigriceps: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 72-73, pl. 3, fig. 3; The vertebrate fauna of the Malay Peninsula; Reptilia and Batrachia, 1912, pp. 171-172.

Dipsadomorphus pallidus Boulenger, Fasciculi Malayenses, Zoology, vol. 1, 1903, p. 164, fig. (type-locality, Bukit Besar, Jalor [= Pattani province, Thailand]).

Boiga nigriceps: M. Smith, Bull. Raffles Mus., no. 3, Apr., 1930, p. 64; Tweedie, The snakes of Malaya, 1954, p. 76.

Dipsas Hoffmanseggi Peters, Mon. Akad. Wiss. Berlin, 1867, p. 27 (type-locality, Java).

Dipsas flavescens var. Jan *in* Jan and Sordelli, Iconographie générale des ophidiens, vol. 3, livr. 38, pl. 5, fig. 2.

Diagnosis: Scales in 21 rows at middle, median row enlarged; snout longer than eye. Subcaudals more than 114; one preocular very close to or touching frontal; no ventral stripes.

Description of species[*] (after Boulenger, *loc. cit.*, 1912, p. 171-172): Anterior palatine and mandibular teeth enlarged. Snout longer than eye. Rostral broader than deep; frontal as long as broad, or a little longer than broad, as long as its distance from end of snout, shorter than parietals; loreal as long as deep or longer than deep; one preocular, in contact with or narrowly separated from frontal; two postoculars; temporals, 1 + 2, 2 + 3, or 3 + 3; eight upper labials, third, fourth, and fifth entering orbit; four or five lower labials in contact with anterior chinshields, which are usually shorter than posterior. Scales in 21 rows, vertebral row strongly enlarged. Ventrals, 240-263; anal, entire; subcaudals, 140-154.

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[*] This species is represented by a single specimen from Thailand taken in Jalor [= Pattani] and described by Boulenger (*loc. cit.* 1903) as *Dipsadomorphus pallidus*. This subsequently was placed in the synonymy of *Boiga nigriceps* by Boulenger (1912).

Color: Head uniform blackish or purplish grey above; body reddish or pale greyish brown, uniform or irregularly mottled with darker, sometimes with the dorsal series of small black spots; upper lip and lower parts yellowish-white; belly and tail often speckled with gray.

Measurements in mm.: Total length, 1650; tail, 410.

Distribution: The species is known in Thailand only in the province of Pattani (Bukit Besar). It occurs in Borneo, Java, and Malaya.

Boiga jaspidea Duméril, Bibron, and Duméril

(Fig. 68)

Dipsas cynodon (*part.*) Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 269.

Triglyphodon jaspideum Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, pp. 1093-1097 (type-locality, Java).

Dipsas fusca (*non* Gray) Motley and Dillwyn, Cont. Nat. Hist. Labuan, 1855, p. 48, pl. (type-locality, Labuan, Borneo).

Dipsas boops Günther, The reptiles of British India, 1864, p. 309, pl. 24, fig. G. (type-locality, Bengal?); F. Müller, Verh. nat. Ges. Basel, 7, 1882, p. 151.

Dipsas jaspidea: Jan, Elenco Syst. Ofid., 1863, p. 104.

Dipsadomorphus jaspideus: Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, p. 73; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 170-171 (Java, Borneo, Malaya and Singapore).

Boiga jaspidea: Sworder, Singapore Nat., no. 2, 1922, p. 66, Singapore; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 64, (key to Malayan *Boiga*); Tweedie, Snakes of Malaya, 1953 (also 1954), p. 76 (Jasper Cat-Snake).

Diagnosis: A large arboreal snake reaching a length of about one and one-half meters; scales in 21 (rarely 23) rows at middle of body, median row enlarged; preocular touching frontal; one or two preoculars, two postoculars; temporals, 2 + 2.

Description of species (from EHT-HMS, No. M. 22, Maxwell's Hill, Perak, Malaya): Head distinct from neck, body compressed;

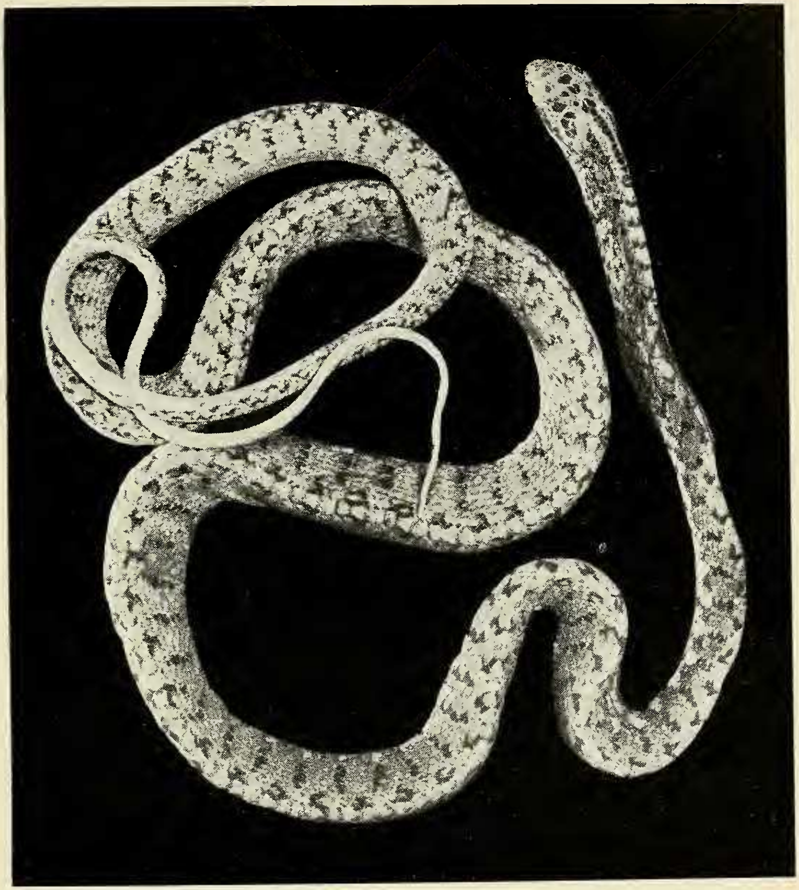

FIG. 68. *Boiga jaspidea* Duméril, Bibron and Duméril. EMT-HMS No. M 22, Maxwell's Hill, Malaya. Actual total length, 838 mm.; tail, 213 mm.

rostral distinctly broader than high, narrowly visible from above; internasals broader than long, touching only nasals laterally; prefrontals broader than long touching nasal, loreal, preocular, but not supraocular; their common suture distinctly shorter than that between internasals; frontal large, about as broad as long (5 mm. x 5.2 mm.), longer than its distance to tip of snout, about five sixths as long as parietal; latter nearly as wide as long (5.4 x 6 mm.); nasal not or only partially divided, more or less deeply concave in posterior portion, which is distinctly larger than anterior; loreal small, distinctly higher than long; two preoculars, upper large, reaching upper surface of head and touching frontal; supraocular much widened posteriorly, practically as long as frontal; two postoculars, upper much the larger; temporals, 2 + 2; upper anterior temporal touching postoculars; eight (nine on left side) supralabials, third, fourth, and fifth bordering orbit, last longest; eye large, its diameter equal to its distance from rostral.

Mental triangular wider than rostral; infralabials, 12-12, five touching first chinshields which are about same size as second pair; latter separated by scales; first pair also separated by a narrow scale; one pair of scales between chinshields and first ventral.

Median scalerow enlarged, the scales broader than long; scales smooth, without apical pits, forming diagonal transverse rows; scalerow-formula: 27 (occiput), 19, 23, 17. Ventrals angular laterally but not keeled or notched; ventrals, 259; anal, single; subcaudals, 155, all divided except terminal scale.

Teeth: Maxillary, eight subequal; mandibular, 16 diminishing slightly in size posteriorly.

Color: Above brown to olive-brown with a median series of irregular black flecks or spots, often paired with lighter areas between; lateral series of vertical bars or spots usually not contiguous with median spots, but touching small cream spots ventrolaterally that are situated on outer scalerow and outer edge of ventrals; a series of subquadrangular black spots, closely spaced anteriorly, but fewer posteriorly and less distinct, often separated by three unspotted ventrals; entire ventral surface yellowish with fine black spots on chin and throat. Anterior part of venter without pigment; latter two thirds with a fine peppering of brownish pigment, becoming thicker posteriorly; subcaudal region also heavily pigmented, while tail is generally marked like body. Most head scales with more or less symmetrical light-edged black spots, and an inch-long nuchal black stripe from parietals; supralabials light with black spots on sutures.

Measurements in mm.: Snout to vent, 625; tail, 213; total, 838; length of head, 16; width of head, 11.

Distribution: A single specimen of this species has been taken in Thailand by Nai Prayoon Kananuracks at Na Pradoo, Pattani. Elsewhere it is known from Borneo, Java, Malaya and Singapore.

Variation: The ventrals are known to vary between 243 and 267; the subcaudals from 140 to 166. There may be one or two preoculars and the labials are either eight or nine. The color in life is often reddish brown speckled with black and pink, sometimes with black and pink bars. (*fide* Tweedie, *loc. cit.*).

Boiga cynodon (Boie)

(Fig. 69)

Dipsas cynodon Boie, Isis, 1827, p. 559 (type-locality, Java); Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 268, pl. 11, figs. 10, 11; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 924; Catalogue of Malayan Reptiles, 1847, p. 77 (*part.*); Günther, The reptiles of British India, 1864, pp. 308-309; Jan and Sordelli, Iconographie générale des ophidiens, vol. 3, livr. 38, 1871, pl. 6, fig. 1 (Sumatra); Sclater, Journ. Asiat. Soc. Bengal, vol. 60, 1891, p. 244; Boettger, Abh. Mus. Dresden, 1894-95, no. 7, 1895, p. 4.

Opetioden cynodon: Duméril, Bibron, and Duméril, Erpétologic générale . . . vol. 7, pt. 2, 1854, pp. 907-911.

Eudipsas cynodon: Fitzinger, Systema Reptilia, Fasc. 1, 1843, p. 27; Günther, Catalogue of the colubrine snakes in the collection of the British Museum, 1858, p. 168.

Dipsadomorphus cynodon: Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, pp. 78-80 (*part.*); A vetebrate fauna of the Malay peninsula . . . 1912, p. 172.

Boiga cynodon: Griffin, Philippine Journ. Sci., sec. A, 1909, no. 4, p. 599 (Palawan); Stejneger, Med. Zool. Mus. Kristiania, vol. 2, 1922, p. 82; Taylor, Snakes of the Philippine Islands, 1922, p. 206; Sworder, Singapore Naturalist, 1923, p. 67; Taylor, Philippine Journ. Sci., vol. 22, no. 5, 1923, p. 553; Wall, Journ. Bombay Nat. Hist. Soc., 1924, p. 874; Sworder, Singapore Naturalist, 1924, p. 20; *ibid.*, 1924, p. 22; M. Smith, Bull. Raffles Mus., no. 3, Apr. 1930, p. 65; Mertens, Abh. Senck. naturf. Ges., vol. 42, 1930, p. 315; Bourret, Les serpents de l'Indochine, vol. 2, 1936, pp. 318-320, fig. 129 (after Jan and Sordelli).

Diagnosis: Large snakes exceeding two meters in overall length; head very distinct from neck; body very strongly compressed; anterior palatine and mandibular teeth much enlarged; one preocular, two postoculars; three supralabials enter eye; scales in 23-25 rows at mid-body; vertebral scales much enlarged; ventrals, 245-292; anal, entire; subcaudals, 116 to 159. Yellowish fawn or pale reddish brown with dark brown or black transverse spots often enclosing a light median spot; a black streak on head behind eye.

Description of species (from No. 1718): Rostral about as broad as high, scarcely visible above; internasals moderate (injured in this specimen); prefrontals large, a little broader than long, frontal about as long as wide, shorter than its distance from tip of snout and shorter than parietals; a triangular depression on head following frontal formed by the elevation of the parietals; parietals distinctly longer than wide; nasal divided, nostril a vertical slit; loreal longer than high, touching three supralabials; a large preocular narrowly separated from frontal; supraocular distinctly narrower than frontal; two postoculars, upper largest, touching parietal and first upper temporals; temporals, 3 + 3 on right side, $\frac{1}{2+3}$

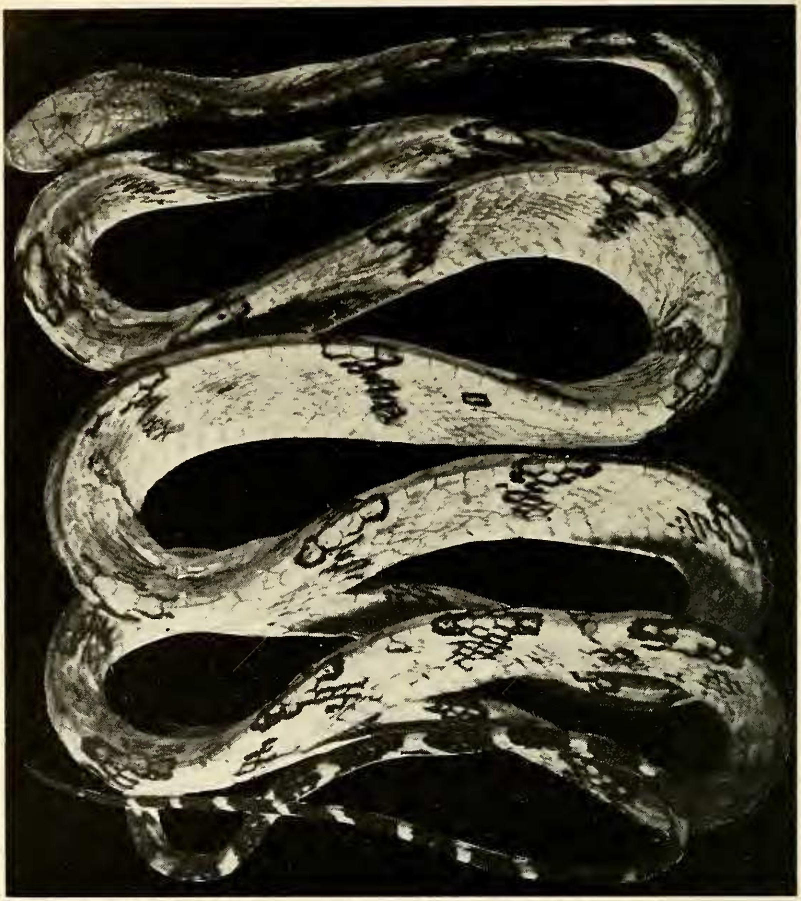

FIG. 69. *Boiga cynodon* (Boie). No. 1718, Forest Experimental Station Khao Chong, Trang province. Actual total length, 2490 mm.; tail 515 mm.

on left side; supralabials, 9-9, third, fourth, and fifth border orbit; mental narrower than rostral; anterior chinshields broader but shorter than second pair; infralabials, 13-14, five border on first chinshields; second chinshields in contact for about half their length.

Scale-formula, 27, (occiput), 25, 23, 15, median row enlarged except on neck; scales smooth with paired apical pits; ventral scales not angulate; ventrals, 282; anal, single; subcaudals, 143.

Color: Above generally fawn to a bright reddish brown above with a series of transverse bands on back, irregular anteriorly, most bands enclosing lighter areas on middorsal line, which cover three or four vertebral scales; remaining scales of the black spots may have lighter centers at middle of body; these bands separated by from three to five centimeters farther back; dark bands and intervening lighter areas are about same size; on tail, bands darker, while intervening light areas may be only one fifth as wide as dark band. Neck brownish yellow below; remainder of venter clouded grayish brown with indistinct lighter spots along outer edge of ventrals; subcaudal region dark, clouded with black and white spots. Head nearly uniform light reddish brown, labials lighter; a sharply defined black stripe extending from eye to near jaw-angle.

Measurements in mm.: Snout to vent, 1975; tail, 515; total length, 2490; length of head, 52; width of head, 27.5.

Variation: There seems to be no intermediate individuals showing a mixture of the color patterns of this and the blackish form described herein, despite the fact that both forms occur in the same area. It would seem that they are distinct populations each maintaining its own characteristics, but of this I am not certain.

Distribution: So far as I am aware, the blackish form has not been obtained north of Na Pradoo, Pattani, nor south of Singapore, while the typical form described above has a range from Assam and Burma, south through Thailand, Malaya and to the islands of the Indo-Australian Archipelago as far as the Philippines.

Another uniformly fawn-colored form occurs in Borneo and Mindanao together with the typical one. The blackish form does not occur there so far as is known.

Boiga cynodon var. (Boie)

Dipsadomorphus cynodon var. B., Boulenger, Catalogue of the snakes of the British Museum, vol. 3, 1891, pp. 78-80 (Malacca).

Boiga cynodon (*part.*): Tweedie, The snakes of Malaya, 1854, p. 77 ("a melanistic variety is not uncommon").

Diagnosis: Characters of typical *cynodon* but dark brown or blackish; venter blackish.

Description of species (from P.K. No. 100, Na Pradoo, Pattani south Thailand): Head very distinct from body; body compressed; rostral a little wider than high with a very narrow triangular portion visible above; internasals a little broader than long, touching only nasal laterally; prefrontals broader than long, touching nasal, loreal, and preocular laterally; frontal a little longer than broad (7 mm. × 9 mm.); distinctly shorter than its distance from tip of snout, shorter than parietal; width of parietal (9 mm.) less than length, (11 mm.); nostril large, nasal small, partially or completely divided, posterior portion more or less concave; loreal one and one-half times as long as wide; preoculars large, reaching upper surface of head, failing to reach frontal; supraocular four fifths as wide as frontal; two postoculars, upper touching parietal; temporals, 3 + 3 (irregular on right side); nine supralabials, eighth largest, fourth, fifth, and sixth bordering orbit; eye large, pupil vertical, its diameter about equal to its distance from nasal.

Mental broad, equal to width of rostral; two pairs of chinshields, posterior slightly the larger; twelve infralabials, four touching first pair of chinshields, five (or four) touching second pair; one pair of small scales between first ventral and second chinshields; scales smooth without apical pits.

Scalerow-formula: 33 (about occiput), 25 on neck, 23 middle, 15 before vent; vertebral series enlarged; transverse scale series forming diagonal rows. Ventrals, 279; anal, single; subcaudals, 156, divided, except terminal scale.

Teeth; maxillary and palatal teeth injured; mandibular teeth 17, the first three or four large, curved, fanglike; others diminishing in size; last nine subequal.

Color (in preservative): Above generally black with about 22 gray blotches on latter three fourths of body and a row of cream or ivory ventrolateral spots, alternate ones being fused with gray blotches; on anterior fourth of body a few blotches of cream outlined by skin color where scales are separated; tail with 28 bands (or spots, as some bands are broken); head black, much flecked with lighter color; labials light with black spots on sutures; chin and neck ivory, flecked with gray-black; farther back the black soon covering venter and subcaudal area except that the posterior edge of each ventral has a fine whitish edge.

Measurements in mm.: Total length, 2040; tail, 497; with of head, 26; length of head, 45.

Distribution: A single specimen captured at Na Pradoo, Pattani, southern Thailand by Nai Prayoon Kananuracks has been the only Thai specimen available for study. Outside of Thailand this form has been reported from Malaya and Singapore.

Genus *Dryophis* Dalman

Dryophis Dalman, Analect. Entomology, 1823, p. 7 (substitute name for *Dryinus Merrem,* preoccupied; type of genus, *Coluber nasutus* Merrem, designated by Boie, Isis, 1827, p. 519).

Passerita Gray, Ann. Phil. (new series), vol. 10, 1825, p. 208 (also a substitute name for *Dryinus;* type of genus, *mycterizans*).

Tragops Wagler, Natürliches System der Amphibien, 1830, p. 184 (type of genus, *rasinus*).

Herpetotragus Fitzinger, Systema reptilia, 1843, p. 27 (type of genus, *nasuta*).

Diagnosis: Slender elongate snake with rather sharply pointed head; maxillary teeth very unequal, first five increasing in size, closely followed by two ungrooved fanglike teeth; and following a diastema, seven smaller equal-sized teeth preceding two enlarged grooved fangs. Head distinct from neck with sharp canthus; scales smooth in 15, 15, 13 rows the scales also in diagonal transverse rows; eye transversely oval with horizontal pupil.

Three species of this genus enter our territory. They may be differentiated by the following key:

KEY TO THAI SPECIES OF *Dryophis*

1. Snout with a pointed dermal appendage, extending far beyond the lower jaw, and formed from rostral scale with, rarely, small separate scales at base . . . . *nasuta*
   Snout lacking a pointed dermal appendage 2
2. Ventrals 194-235, subcaudals 151-187, anal divided . . . . *prasinus*
   Ventrals 186-195; subcaudals 136-156, anal single . . . . *mycterizans*

The snakes of this genus are arboreal. In the Philippines they are called *dahun palay* (the leaf of rice), and feared. They are often found on bushes at from five to six feet elevation and are reputed to strike at the eyes of passers-by. They bear a very marked superficial resemblance to species of *Oxybelis* a genus of arboreal serpents in the Western Hemisphere.

Dryophis prasinus Reinwardt, *in* Boie

(Fig. 70)

Coluber nasutus Russell, A continuation of an account of Indian serpents . . . vol. 2, 1801-1809 (1801), p. 28, pl. 24 (type-locality, Java) (not *C. nasutus* of de Lacépède).

Dryophis prasinus Reinwardt, *in* Boie, Isis, 1827, p. 545 (type-locality, Java); Flower, Proc. Zool. Soc. London, 1896, p. 890, *ibid.*, 1899, p. 682; Boulenger, The fauna of British India including Ceylon and Burma . . . Reptilia and Batrachia, 1890, p. 369; Catalogue of the snakes of the British Museum, 2nd Ed., vol. 3, 1896, pp. 180-182; A vertebrate fauna of the Malay peninsula . . . Reptilia and Batrachia, 1912, p. 175; Wall, Journ. Bombay Nat. Hist. Soc., vol. 17, 1906, p. 7; *ibid.*, vol. 19, 1909-10, pp. 353, 834; *ibid.*, vol. 29, 1924, p. 877; de Rooij, The reptiles of the Indo-Australian Archipelago, Ophidia, vol. 2, 1917, pp. 206-207, fig. 79; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 4, 1920, p. 97; Rec. Indian Mus., vol. 42, 1940, p. 484. Bourret, Les serpents de l'Indochine, 1936, p. 330; Bull. Instr. Pub. Hanoi, 1939, p. 28; Shaw, Shebbeare and Barker, Journ. Bengal Nat. Hist. Soc., vol. 16, 1941, p. 62; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1147-1148 (Loei province).

Passerita prasina: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 66; Sworder, Singapore Nat., no. 2, 1922, p. 67.

Ahaetulla prasina: Stejneger, Copeia, 1933, p. 203; Pope, The reptiles of China . . . 1935, pp. 322-324, pl. 13, figs. J, K, L, M, N, O.

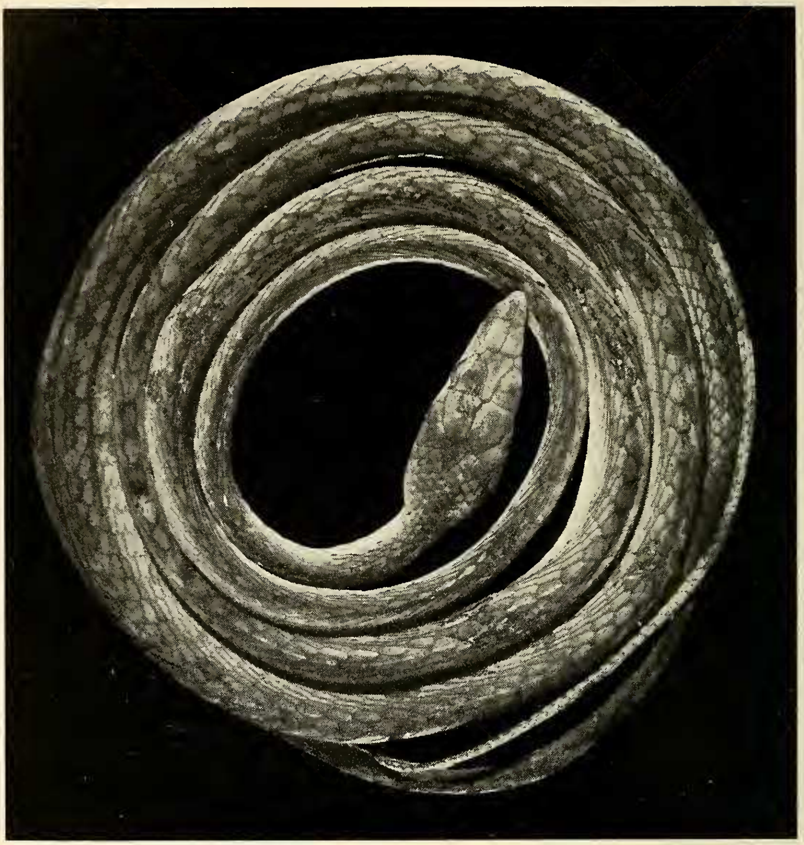

FIG. 70. *Dryophis prasinus* (Reinwardt, *in* Boie). No. 36534, Doi Suthep, Chiang Mai province, northern Thailand. Actual total length, 1388 mm.; tail, 450 mm.

Dryophis prasinus flavescens Smith, Journ. Bombay Nat. Hist. Soc., vol. 23, 1915, p. 785 (type-locality, Trang, Thailand).

Dryophis prasinus indicus Mell, Sitzungsb. Ges. Nat. Fr. Berlin, 1930, p. 323 (type-locality, India).

Dryophis prasinus chinensis Mell, Sitzungsb. Ges. Nat. Fr. Berlin, 1930, p. 323 (type-locality, China).

Diagnosis: Head elongated, distinct from neck; snout pointed; rostral with a free edge above, but not bearing a distal dermal appendage; snout at least twice as long as eye; canthus rostralis sharp; no horizontally divided labials; anal normally divided. Scales of males keeled in region above vent; three labials border orbit; ovoviviparous.

Description of species (from No. 33658, Chiang Mai): Rostral nearly ventral directed forwards and upwards, only upper free edge visible from above; internasals narrowed anteriorly about one and three-fourth times as long as wide; prefrontals bending down sharply at canthus, total width more than half their length; frontal widened anteriorly then much narrowed posteriorly, its widest part less than width of supraoculars, its length less than its distance from tip of snout, approximately as long as parietal or a little longer; nasal small, pointed behind nostril in posterior part of scale; two small loreals on one side, absent on other side; large preocular bent across canthus and bordering frontal, strongly convex; two postoculars; temporals, 1 + 2 + 2; supralabials, 8-9; on right side lower part of fourth labial joins third thus leaving a second "preocular," and which with the two following labials enters orbit; on left side three labials enter orbit; infralabials, 8-8, four touching first chinshields, which are wider but considerably shorter than second pair.

Scale-formula: 19 (occiput), 15, 13. Scales elongate, smooth throughout (keeled in males in region of vent) and arranged in oblique transverse rows, the median longitudinal row somewhat enlarged. Ventrals, 209½, subcaudals, 177. Ventrals keeled, often with a small notch where scale bends up; cream marks under chin. On maxillary, eighth and ninth teeth suddenly enlarged and fanglike, followed after several small teeth by two grooved fangs. The third and fourth teeth in dentary, fanglike, abruptly enlarged.

Color in life: Yellowish green or leaf green above, interstitial skin black and white forming oblique lines; ventrals paler green with a yellowish or whitish line along keels on each side of ventrals.

Measurements in mm.: Snout to vent, 934; tail, 526; width of head, 13.7; length of head, 36.

Variation: Two or three loreals may be present, (rarely absent); temporals, 2 + 2 or 2 + 3; ventrals vary between 194-235; subcaudals, 165-187 ♂; 151-172 ♀. Usually two anals, rarely one. The species is variable in color, and green, gray, cream, fawn or yellow specimens may appear. These variants do not seem to be geographical in their distribution.

Distribution: The species is common in Thailand occurring probably in most of the provinces. Outside of Thailand very widespread from Sikkim through Southeastern Asia, the Malay peninsula and islands of the Indo-Australian Archipelago.

Dryophis mycterizans (Linnaeus)

Coluber mycterizans (Linnaeus), Systema naturae, Ed. 10, 1758, p. 226 (type-locality, "America" *ex errore*); Andersson, Bih. Sven. Vet. Akad. Stockholm, vol. 24, 1898, 4, 6, p. 14

Dryophis xanthozona Boie, Isis, 1827, p. 545 (type-locality, Java); Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, p. 180; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 175 (Trang).

Dryinus prasinus (*part.*): Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 928.

Passerita xanthozonia: M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 66.

Diagnosis: A slender snake, snout twice as long as eye; prefrontals twice as long as broad; supralabials not horizontally divided; no dermal appendage on tip of snout; anal, single.

Description of species: Snout pointed, feebly projecting without appendages, about twice as long as eye; internasals in contact with rostral; frontal a little longer than its distance from end of snout, as long as parietals; a series of three or four small loreals; one preocular, in contact with frontal, two postoculars; temporals, 2 + 2; eight or nine supralabials, fourth and fifth, or fourth, fifth, and sixth entering orbit; four infralabials touching anterior chinshields which are much shorter than posterior.

Scalerow-formula: 15, 15, 13; the transverse rows of scales disposed obliquely; vertebral row slightly enlarged; ventrals, 186 to 195; subcaudals, 132-156; anal, single.

Color: Usually green, grayish green, or grayish; interstitial skin black and white; venter whitish; a white line along outer margin of ventrals, heavily edged inside with green or gray; sometimes a median ventral line of white; throat white.

Measurements in mm.: Total length, 1080 ♀ ; tail, 410.

Distribution: Known in Thailand only from Trang province and Tasan, near the Isthmus of Kra. Outside of Thailand it is known from Java and Malaya.

Remarks: The name *xanthozona* was for a long time applied to this form but an examination of the Linnean type specimen by Andersson shows that the name *xanthozona* is a synonym of *mycterizans*, a name that had long been applied to the *Coluber nasutus* of Lacépède.

Dryophis nasutus (Lacépède)

(Fig. 71)

Coluber nasutus Lacépède, Histoire naturelle des serpents, vol. 2, 1789. Discourse and table methodique, p. 100, 277-279, pl. 4, fig. 2 (type-locality, Ceylon, restricted by Taylor and Elbel, 1958).

Dryinus oxyrhynchus Bell, Zoolog. Journ., vol. 2, p. 326 (type-locality, India).

Dryinus russellianus Bell, *ibid.*, p. 327 (type-locality, India).

Dryophis nasutus: Andersson, Bih. Sven. Vet. Akad. Stockholm, vol. 24, 1898, 4, 6, p. 15; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 376-378, figs. 118, 119; Taylor, Univ. Kansas Sci. Bull., vol. 33, pt. 2, Mar. 10, 1950, p. 581; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1148-1149.

Passerita nasuta: Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 32.

Ahaetulla nasuta: Stejneger, Copeia, 1933, p. 203.

Coluber mycterizans: (*non* Linnaeus) Russell, An account of Indian serpents collected on the coast of Coromandel . . . vol. 1, 1796, pp. 16, 18, pls. 12, 13 (type-locality, Vizagapatam, India).

Dryophis mycterizans: Boulenger, The fauna of British India, Ceylon and Burma . . . Reptilia and Batrachia, 1890, pp. 370-371, fig. 108; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 182; Finn, Journ. Asiat. Soc. Bengal, vol. 47, 1898, p. 66; Alcock and Rodgers, Proc. Royal. Soc. London, vol. 7, 1902, p. 446; Kinnear, Journ. Bombay Nat. Hist. Soc., vol. 21, 1912, p. 1336; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, pt. 3, March, 1915, pp. 174, 187, 214 (Bangkok); Wall, Journ. Bombay Nat. Hist. Soc., vol. 16, 1905, pp. 308, 542; pl., *ibid.*, vol. 26, 1909, p. 572; Wall, The snakes of Ceylon, 1921, p. 291; Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 172. Bourret, Les serpents de l'Indochine, 1936, p. 333; Cains, Journ. Bombay Nat. Hist. Soc., vol. 26, 1919, p. 862; McCann, Journ. Bombay Nat. Hist. Soc., vol. 32, p. 1928, p. 612, *ibid.*, vol. 37, 1934, p. 226; Fraser, Journ. Bombay Nat. Hist. Soc., vol. 39, 1937, p. 484; Shaw, Shebbeare and Baxter, Journ. Bengal Nat. Hist. Soc., vol. 16, 1941, p. 63; Taylor, Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, p. 307 (Chiang Mai, Thailand).

Dryophis mycterizans anomalus Annandale, Mem. Asiat. Soc. Bengal, vol. 1, 1906, p. 196 (type-locality, Ramanad, S. India); Wall, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910, p. 524.

Drypohis mycterizans tephrogaster Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 783 (type-locality, Burma).

Dryophis mycterizans zephrogaster Wall, *ibid.*, vol. 20, 1909, p. 229 (type-locality, Burma).

Dryophis mycterizans cinereoventer: Wall, *ibid.*, vol. 18, 1908, p. 919 (error ? possibly meant for *tephrogaster*).

Dryophis mycterizans rhodogaster Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 919 (type-locality, Schwebo, Upper Burma).

Dryophis mycterizans lepidorostralis Wall, *ibid.*, vol. 20, 1910, p. 229 (type-locality, Bengal).

Dryophis mycterizans isabellinus Wall, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910, p. 230 (type-locality, Paralai near Valpari Anamallai Hills).

Dryophis mycterizans rhodonotus Wall, The snakes of Ceylon, 1921, p. 293 (type-locality, Galatura Estate, Ceylon).

Diagnosis: Slender arboreal snake, with a dermal process on lip of snout extending far beyond lower jaw and formed wholly from rostral scale; no loreal present; sharp canthus rostralis; length of snout (without appendage) usually 2½ to three times length of eye; one preocular touching frontal; normally eight supralabials, third and fourth entering orbit. Usually green, but may be pinkish, fawn, yellowish, leaden, gray, brown, etc.

Description of species (from No. 786 Bangkok): Rostral narrow, attenuated as if pulled forward and bent back over tip of snout

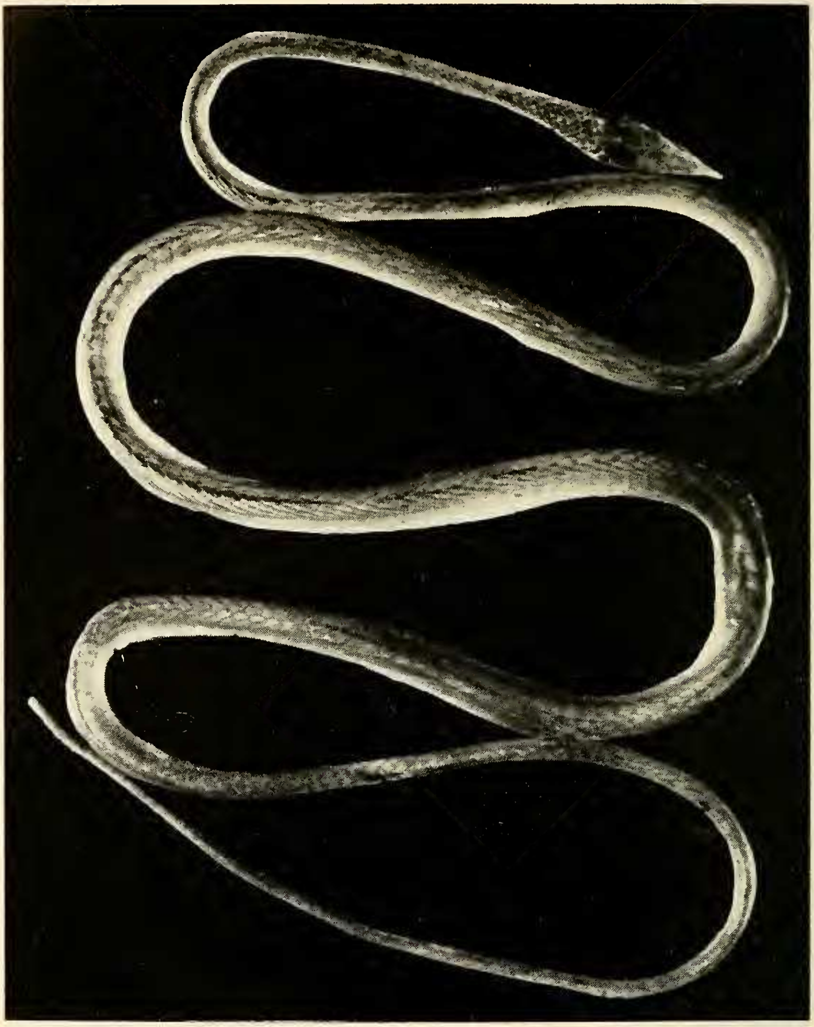

FIG. 71. *Dryophis nasuta* (Lacépède). No. 786 Bangkok (city). Actual total length, 998 mm.; tail, 358 mm.

with dorsal and lateral grooves. Nasals greatly elongated forming two lateral crests in contact or minutely separated in front of internasals; nostril pierced in posterior end of nasal; internasals longer than nasals, more than twice as long as wide, pointed anteriorly, outer portion extending behind nasal and in contact with two supralabials; prefrontals touching labial, only a little longer than wide; canthus rostralis strongly marked; preocular concave, bordering frontal; frontal scarcely as wide as supraoculars, much narrowed posteriorly, its length less than its distance from rostral, its length equal or slightly greater than parietal; no loreals; two postoculars, upper largest; temporals, 2 + 2 + 2, lower primary temporal small; eight supralabials, first elongate and pointed anteriorly, fourth divided into three parts leaving what appears to be a lower preocular and a subocular, both bordering orbit; the following (fifth) labial also enters orbit; infralabials, 10-9, four bordering first chinshields, which are wider but much shorter than posterior pair.

Scalerows: 24 (occiput), 15, 15, 11. Ventrals, ♀ 193; anals, 2; subcaudals, 155.

Color: Brown (in life, green) with chin cream; a cream ventrolateral line to tip of tail. Venter purplish, probably a shade of green in life; interstitial skin cream.

Measurements in mm.: Total length, 998; tail, 358; head width, 8.7; head length, 27.7.

Remarks: This species, long known as *Dryophis mycterizans,* is identical with Lacépède's *nasutus;* the type-specimen is not *mycterizans* of Linnaeus.

The snake is somewhat remarkable for its appearance in very different colors. Many of these color forms have been named but seemingly they are not geographical and may appear anywhere in its range. These may be buff, fawn, gray, yellowish, bluish, brown, pink, rose, etc.

Distribution: In Thailand it occurs in the central and northern parts but it is not known whether it reaches down into the peninsula any great distance. It has been taken as far north as Doi Suthep, Chiang Mai province.

It is known also in Ceylon, India and Burma.

Genus *Dryophiops* Boulenger

Dryophiops Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 193-194 (type of genus, *Dipsas rubescens* Gray).

Diagnosis: Body very slender, compressed; head elongate, distinct from neck; pupil of eye horizontal; nasal undivided; frontal narrow, bell-shaped; scales unkeeled, oblique, in 15 rows; ventrals and divided subcaudals each with lateral keels and notches. Maxillary teeth 20, subequal, last two or three enlarged and grooved; anterior mandibular teeth enlarged.

Two species are recognized, one occurring in Thailand. The other presumably is confined to the Philippines.

Dryophiops rubescens (Gray)

(Fig. 72)

Dipsas rubescens Gray, Illustrations of Indian Zoology, vol. 2, 1834, pl. 84, fig. 2 (type-locality [probably], Malay Peninsula).

Leptophis rubescens: Blyth, Journ. Asiat. Soc. Bengal, vol. 23, 1855, p. 293.

Chrysopelea rubescens (*part.*): Günther, Catalogue of the colubrine snakes in the collection of the British Museum, 1858, p. 145; The reptiles of British India, 1864, p. 299.

Dryophis rubescens: Jan and Sordelli, Iconographie générale des ophidiens, livr. 32, 1869, pl. 6, fig. 1.

Dryophiops rubescens: Boulenger, Catalogue of the snakes in the British Museum, Ed. 2, vol. 3, 1896, p. 194; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 176 (Penang, Siam, Sumatra, Borneo, Mentawei and Natuna Islands); Smedley, Malayan Nat., vol. 2, no. 1, p. 47 (Changi, Singapore); Taylor, Philippine Journ. of Sci., vol. 26, no. 1, 1925, pp. 110-111 (Peñon de Coron, Philippine I.); Tweedie, The snakes of Malaya, 1954, p. 82 (Singapore to Kedah and Kelantan).

Diagnosis: See generic description; also differs from *Dryophiops philippina* in having an elongate loreal scale.

Description of species (B.M. No. 1912.2.22.21, Kelantan, Malaya): Rostral more than twice as broad as high, narrowly visible from above; internasals nearly as wide as prefrontals, but much shorter laterally, touching only nasal; prefrontals longer than broad, their common suture not quite twice length of that between internasals; frontal narrow, bell-shaped, anteriorly only a little wider than supraocular, its length greater than its distance from tip of snout, shorter than parietals; parietals large, followed by a median enlarged postparietal scale; nasal small, undivided, wedge-shaped; loreal slender, elongate; preocular large, reaching upper surface of head and in contact with frontal; supraocular larger in area than frontal; three postoculars; temporals, 2 (3) + 2 + 2; supralabials nine, fourth to sixth bordering eye; seventh largest; mental with a smaller labial border than rostral; first labials in contact behind mental; ten infralabials, first five in contact with first chinshields, which are much shorter than second pair; latter in contact with each other nearly entire length.

Ventrals, 202½; anal, divided; subcaudals, 149, divided; both ventrals and subcaudals with lateral keels and notches.

Scale-formula: 21 (occiput), 15, 15, 11; the median and outer rows somewhat largest; others narrow, oblique.

Color: Above gray with fine flecks and marbling; a median irregular series of small black spots, the row often broken; head somewhat olive, flecked with darker and lighter, this color extending somewhat onto neck; chin and throat yellowish, the color extending some inches on underside of body; an irregular brownish stripe

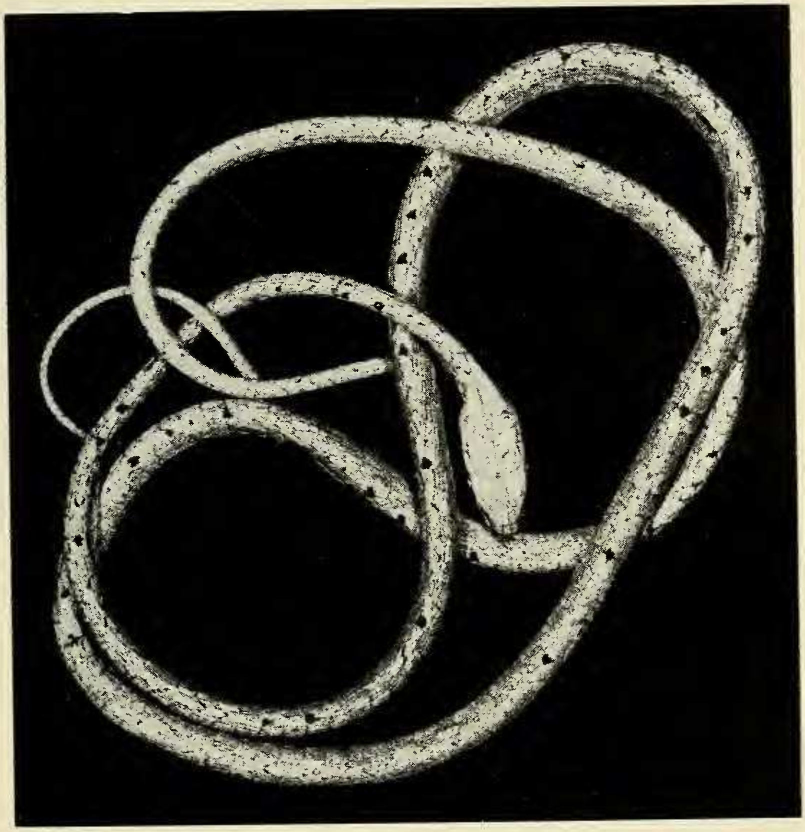

Fig. 72. *Dryophiops rubescens* (Gray). B.M. No. 1912.2.22.21, Kelantan, Malaya. Actual total length, 646 mm.; tail, 200 mm.

from tip of snout through eye continuing some distance on neck, the lower edges darker (blackish or brownish); most of area of supralabials, cream-white.

Measurements in mm.: Snout to vent, 446; tail, 200; total length, 646; width of head, 7; length of head, 14.

Variation: A specimen is at hand (EHT-HMS, No. 3863) that I collected in 1961 at Na Pradoo, Pattani. The color differs in being generally bronzy reddish-brown to magenta above, the scales showing larger or smaller darker diagonal areas which results in indefinite spotting. The venter is somewhat rubescent with some scattered flecks and a peppering of grayish black. The stripe from snout through the eye is present; and the chin and throat are somewhat yellowish.

The ventrals number 193; the anal is divided; the subcaudal, 141. There is a flattening on the snout, more noticeable in this specimen than in the one described. The snout is brownish. However, in both specimens there is a dim light stripe from tip of snout to frontal, its edges a little darker than adjoining color.

I examined four Chulalongkorn University specimens, recently acquired as a gift from Nai Prayoon Kananuraks, taken at Na Pradoo, Pattani. These present the following data:

Table of data of Thai *Dryophiops rubescens*

NUMBER	Sex	Total length	Tail	Ventrals	Subcaudals
CU. 2579......	♀	744	218	198	125
CU. 2580......	♂	765	217	200	131
CU. 2581......	♀	762	215	190	122
CU. 2582......	♀	836	223	197	121

Some of the specimens show a light line across the supraoculars with or without darker flecks, or a darker line with white flecks; in two specimens the supraoculars were slightly wider than the frontal; two postoculars are present rather than three. The temporals are, 2 + 2 + 2 increasing in size posteriorly. If apical pits are present (so stated by Boulenger), they are difficult to discern.

The type in the British Museum, No. 1946.1.9.62 accompanied by a specimen of *Draco taeniopterus* has been examined. It shows three enlarged scales behind the parietals. The specimen contains the remains of a *Hemidactylus frenatus.*[*]

Distribution: In Thailand specimens are known only from Na Pradoo and the nearby Bukit Besar (Mt.). Elsewhere, it is known from Palawan (Philippine I.), Borneo, Sumatra, Mentawei, Natuna Islands, and Malaya.

Genus *Psammodynastes* Günther

Psammodynastes Günther, Catalogue of the colubrine snakes in the collection of the British Museum, London, 1858, p. 140 (type of genus, *Psammodynastes pulverulentus.*

Anisodon Rosen, Ann. Mag. Nat. Hist., ser. 7, vol. 15, p. 176 (type, *lilljeborgi*).

Diagnosis: A small snake about half a meter in length; head distinct from neck, with an angular canthus rostralis; eye large with a vertical pupil; scales smooth in 17 rows about body at middle. Maxillary teeth, 10-12, arranged as follows: two small anterior teeth followed by two much larger ones; these followed by an interval, then five or six small teeth, then two enlarged grooved fangs. Hypapophyses on posterior dorsal vertebrae, somewhat variable.

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[*] A label on the jar gives the locality "Bengal" but the place of origin seems to be most probably somewhere in Malaya.

Only two species are known, *pictus* occurring in Borneo and Sumatra, and *pulverulentus* with a very wide distribution from Mindanao in the Philippines through much of the Indo-Australian Archipelago and southeastern Asia to south China and Nepal. The general variations in the form throughout this wide area has seemingly produced no recognized subspecies.

The species is ovoviviparous. Its poison acts quickly on the small reptiles and amphibians upon which it preys, but it is not regarded as dangerous to man. The snake varies remarkably in color pattern, however the same patterns seem to appear in each population.

Psammodynastes pulverulentus (F. Boie)

(Fig. 73)

Psammophis pulverulenta F. Boie, Isis, 1827, p. 547 (type-locality, Java).

Psammodynastes pulverulentus Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 363; Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 172-174; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1907, pp. 204, 330; *ibid.*, vol. 20, 1910, p. 72, pl.; *ibid.*, vol. 21, 1912, p. 686; *ibid.*, 29, 1924, p. 875; *ibid.*, vol. 30, 1925, p. 818; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1915, pp. 156, 174 (Sai Yoke, Kanchanaburi; Bangkok); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 162; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1915, p. 202 (Siam); M. Smith, Journ. Federated Malay States Mus., vol. 10, 1922, p. 267; Bull. Raffles Mus., no. 3, 1930, p. 66 ("Bangnara, Pattani"; Nakhon Si Thammarat); Cochran, U. S. Nat. Mus., vol. 77, 1930, p. 32 "Nong Khor" "Pak Jong" "Lam at Tong Lang"; Sriracha; Nong Nam Kiew; Pran; "Kao Saming"; Khun Tan Mts.); Pope, The reptiles of China, 1935, pp. 324-327; Bourret, Les serpents de l'Indochine, 1936, p. 326; M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 484; Shaw, Shebbeare and Barker, Journ. Bengal Nat. Hist. Soc., vol. 16, 1941, p. 57; M. Smith, The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 368-370, fig. 116-117.

Dipsas ferruginea Cantor, Proc. Zool. Soc. London, 1839, p. 53 (type-locality, Assam).

Lycodon bairdi Steindachner, Reise Novara . . . Reptilia, 1867, p. 90 (type-locality, Philippines).

Anisodon lilljeborgi Rosen, Ann. Mag. Nat. Hist., ser. 7, vol. 15, p. 176 (type-locality, Java).

Diagnosis: Third or fourth maxillary tooth enlarged, fanglike, followed by a diastema; last of series enlarged, fanglike, grooved. Canthus angular, frontal narrow, the nostril in a single nasal.

Description of species (from EHT-HMS No. 13 Frasers Hill, Malaya): Small snakes (630 mm.); rostral wider than high, ap-

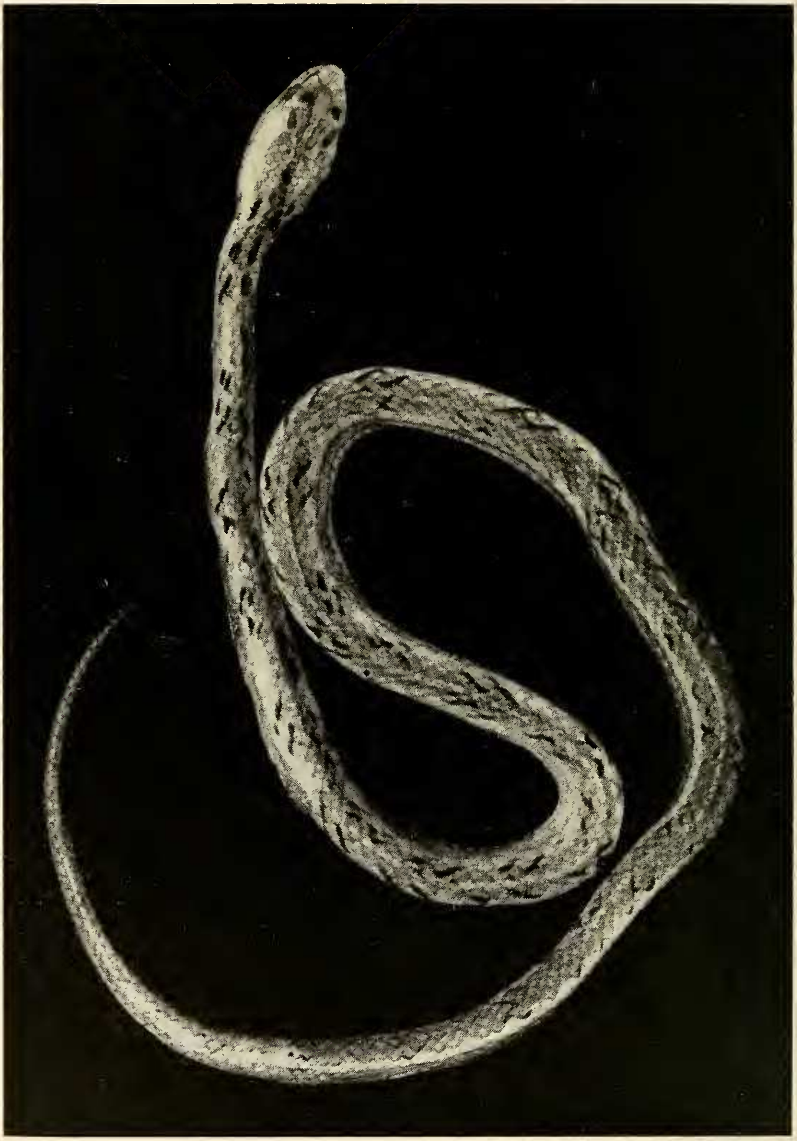

FIG. 73. *Psammodynastes pulverulentus* (Boie). EHT-HMS No. 36014♂, Kaeng Pang Tao, Chiang Mai province, Northern Thailand. Actual total length, 521 mm.; tail, 86 mm.

pearing on dorsal surface of head as a line; internasals small, their common suture a little more than half that between prefrontals, their lateral ends turned down below canthus touching loreal; frontal narrower than supraoculars; latter scales extend forward beyond level of eye, notching preocular; parietals about length of frontal, with an entrant suture cutting the scale laterally. Nostril in a single nasal; loreal a little longer than high; a large irregular preocular barely reaching upper surface of head; two postoculars; single anterior temporal, followed by two or three temporals, touching fifth supralabials; nine supralabials, third to fifth bordering orbit; seven or eight infralabials, three touching first chinshields, which are followed by two somewhat smaller pairs of chinshields, all pairs in contact.

Scale-formula: 19, 17, 15; scales smooth, without pits; ventrals, 171, rounded; subcaudals, 74; anal, single.

Color: Five median scalerows dove-gray, bordered on each side by a dark-edged ivory-white line less distinct anteriorly; sides dirty gray-white; on most of body, but growing less numerous posteriorly, are numerous short diagonally placed dots or lines often encroaching on or crossing light lateral line; on neck four narrow lines develop along borders of the white line and extend forward to occiput; where they disappear; a dim median dark line on occiput; lips and side of head light; white on chin, throat, and venter; grayish in subcaudal region.

Measurements in mm.: Snout to vent, 335; tail, 101; total length, 436; width of head, 8.7; length of head, 18.5.

Variation: The snout in old specimens tends to turn up slightly at the tip. The coloration is especially variable. It may be dark, nearly blackish brown with or without dark and light spots, a more or less dark streak on each side of the head passing through eye, and usually a dark brown stripe along sides; below powdered with brown and with dark spots or longitudinal lines. Usually symmetrical markings are evident on the head.

The loreals may be divided. One or two preoculars, and two to four postoculars may be present. The temporals are usually 2 + 3. The ventral count may vary between 146 and 175, the subcaudals, between 44 and 71.

Distribution: In Thailand specimens have been taken in Chiang Mai, Narathiwat, Kanchanaburi, Pattani, Chon Buri, Phrae, Nong Khai, and Nakhon Si Thammarat. It is a mountain form, usually not occurring much below 2000 ft., although it may reach sea level.

It is known in Indo-China, Southern China, Hainan, northwestern India, and the Indo-Australian Archipelago to the Philippines.

Remarks: The young are born alive. The snake has a poison that is not regarded as dangerous to man. Shaw has reported that a snake, *Rhabdophis subminiata,* struck by one, died in 16 minutes.

Genus *Psammophis* Fitzinger

Psammophis Fitzinger, Neue Classification der Reptilien, . . . 1826, pp. 29-30 (type of genus, *P. sibilans*).

Taphrometapon Brandt, Bull. Acad. Sci. St. Petersburg, vol. 3, p. 243 type, *lineolatus.*

Mike Werner, Sitz. Ber. Akad. Wiss. Wien., vol. 133, p. 51 (type *elegantissimus* = *condenarus*).

Diagnosis: Maxillary teeth 10-13; one or two in middle of series more or less enlarged, fanglike, preceded and followed by a short diastema; last two teeth much enlarged grooved and directed strongly backwards; anterior mandibular teeth strongly enlarged.

Head distinct from neck; angular canthus rostralis; pupil round; scales smooth, more or less oblique in 17 rows (in Oriental forms); ventrals rounded; tail long; paired subcaudals.

A rather large genus, widely distributed in Asia and Africa.

Only one species is known in Thailand, this presumably with a spotty distribution.

Psammophis condenarus Merrem

Psammophis condenarus Merrem, Tentamen systematis amphibiorum 1820, p. 107 (type-locality [based on a plate in Russell], An account of Indian serpents collected on the coast of Coromandel [India], vol. 1, 1796, p. 32, pl. 27 "from Ganjam district").

Malcolm Smith has recognized two subspecies of this serpent, the typical form being confined to parts of India and *P. condenarus indochinensis* which occurs in Thailand.

Psammophis condanarus indochinensis Smith

Coluber condenarus Merrem, Tentamen systematis amphibiorum 1820, p. 107 (Based on Russell, vol. 1, p. 32, pl. 27).

Psammophis condanarus indochinensis M. Smith, The Fauna of British India, including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, December 1943, pp. 364-365 (type-locality, "in Indo-China south of lat. 21°); Taungyi, Pegu (Burma), Lopburi, Bangkok (Thailand), Phan-rang (Annam).

Diagnosis: A slender snake reaching a meter in length. Scales in 17 rows at middle of body; a pair of enlarged grooved teeth at posterior end of maxilla; anal divided; anterior end of frontal not twice as broad as middle; nasal incompletely divided. Frontal longer than its distance from end of snout. Four stripes, median absent; a dorsolateral stripe on the sixth, seventh, and eighth rows.

Description of species (from No. 33639, Doi Suthep, Chiang Mai): Head scarcely distinct from neck; rostral a little wider than high, part visible above about one third as long as internasals; latter scales narrowed anteriorly, slightly longer than wide; prefrontals distinctly longer than wide, their common suture approximately twice that between internasals; frontal narrow, elongate, its width at anterior end not twice its narrowest median width; supraoculars wider than frontal; latter longer than its distance from end of snout, longer than parietals; nasal quadrangular only partially divided, touching two labials; an elongate loreal at least one and one-half times as long as wide; a single large preocular reaching top of head, but separated from frontal; postoculars, 2-2, fused to fifth supralabial; temporals, 1 + 2 + 4 (1 + 2 + 3); eight supralabials, fourth and fifth entering eye; ten infralabials, four touching anterior chinshields which are larger than second pair.

Scale-formula: 27 (occiput), 17, 17, 15-13; scales smooth, transverse rows rather diagonally placed, bearing a single apical pit. Outer row much larger than adjoining row. Ventrals, 170; anal, divided; subcaudals, 73.

The loreal region distinctly concave and canthus rostralis pronounced.

Color: Dark olive with four dark-brown stripes; a dorsolateral one on scalerows six, seven, and eight, separated from its fellow by the slightly lighter colored median row which bears a series of black dots along middle; a lateral band confined to the second row and edges of first and third scalerows; a whitish stripe, black-bordered below, arising on neck, covering outer half of first scale-row and outer edge of ventrals, narrowed on neck and tail; lower parts dark gray, posterior part of each ventral very light gray (in preservative); head dark olive; supralabials lighter with nearly white edges; some of the head scales have lighter edges; lateral stripe continues on to the head through eye, terminating on the snout.

Measurements in mm.: Snout to vent, 345; tail, 100; total length, 445.

Variation: The ventrals vary from 156 to 173, the subcaudals ♂ 75 to 85; ♀ 66 to 75.

Distribution: The species known in Thailand in the provinces of Lopburi and Chiang Mai. Elsewhere it occurs in Burma, and Annam.

Dr. M. Smith points out that the two forms, *C. condenarus* and *C. indochinensis* are separated by large areas where neither subspecies is known.

Specimens are to be found in low shrubs and bushes. Its food is said to consist of small rodents, lizards and frogs. It ascends to elevations of 2000 meters in mountainous areas.

Genus *Chrysopelea* Boie

Chrysopelea Boie, *in* Férussac, Bull. Sci. Nat., vol. 9, p. 237; Isis, 1827, p. 520 (type, *Coluber ornatus*).

Diagnosis: Head somewhat flattened, distinct from neck; scales smooth or weakly keeled with apical pits; ventrals and subcaudals keeled laterally and notched; scalerow-formula: 17, 17, 15. Maxillary teeth 20 to 22, last three or four larger and grooved. Hypapophyses on posterior dorsal vertebrate seemingly may be present or absent.

Two species are recognized as occurring in Thailand, that may be differentiated by the following key:

KEY TO THAI SPECIES OF *Chrysopelea*

1. Hypapophyses absent on posterior dorsal vertebrae. Last ventral shield divided; color green, each light scale with a black median line; head banded in black and yellow; body often banded with black .... *ornata*

Hypapophyses present throughout vertebral column; black above, each scale with a central yellowish spot; often with a median dorsal series of red or yellow flower-shaped spots .... *paradisi*

These snakes are remarkable in many ways and have gained the name of "flying snakes" perhaps as much for their speed in moving from branch to branch as for their ability to glide after taking off into the air from a high branch. I have seen this behavior on one or two occasions, the snake landing some feet beyond the point of take-off.

Their climbing ability is well known. I have seen a specimen move up the almost completely smooth bole of a tree perhaps 14 to 18 inches in diameter, by folding the body in a series of loops transversely on the bole and clinging while the path of movement was back and forth across this surface, advancing higher and higher with each turn; but the movement was so slow that it seemed scarcely perceptible.

Again, in Ceylon, a specimen of *ornata* was observed on the ground grasping a lizard (*Sitania*). The snake confronted by three or four persons, crawled backward some four or five feet to a shrub, elevated its tail to a small branch and proceeded to climb up into the shrub backwards all the time holding on to the struggling lizard. Having found a satisfactory position on a branch some six feet from the ground it proceded to engulf the lizard which by this time had ceased its struggles, perhaps overcome by the snake's poison.

R. Shelford (Proc. Zool. Soc. London, 1906, pp. 227-230, "A note on the 'flying' snakes") reports his experiments with these snakes. He would take them some fifteen to twenty feet from the earth, then permit them to fall and glide, proving beyond question the contention that they are capable of gliding through the air.

Chrysopelea paradisi Boie

(Fig. 73a)

Chrysopelea paradisi F. Boie, Isis, 1827, p. 547 (type-locality, Java): Smith, The fauna of British India, Ceylon and Burma, . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 254-255; Tweedie, The snakes of Malaya 1954, p. 57, fig. 13a.

Chrysopelea ornata: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 196 (*part.*); Annandale, Journ. Asiat. Soc. Bengal, n.s. vol. 1, 1905, p. 126; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 212, fig. (Siam, etc.)

Diagnosis: Similar in habitus to *C. ornata* but body-scales black with a green spot on each scale, largest ones on lower row of scales; often with a median row of bright red or yellow spots somewhat resembling a flower. Venter yellow-green; ventrals blackedged.

Description of species (from M. Smith): Very similar to *ornata* in squamation. Hypopophyses developed throughout the vertebral column. Black above each scale with a central rounded or ovate-acuminate greenish-yellow spot, and without a vertebral series of red or yellow tetrapetalous spots; pale greenish yellow below, ventrals often edged with black. In some specimens the median spots may have a median stippling.

Tweedie (1954) adds this data: Ventrals, 198-238; subcaudals, 106-139; anal, divided. Scales in 17 rows sometimes feebly keeled; 9 or 10 upper labials, fifth and sixth, or fourth, fifth, and sixth bordering eye.

Remarks: This species is included on M. Smith's statement "Range, the Malay Peninsula, extending up the west coast as far north as Mergui." Also known in Java, Sumatra, Borneo and the Philippines.

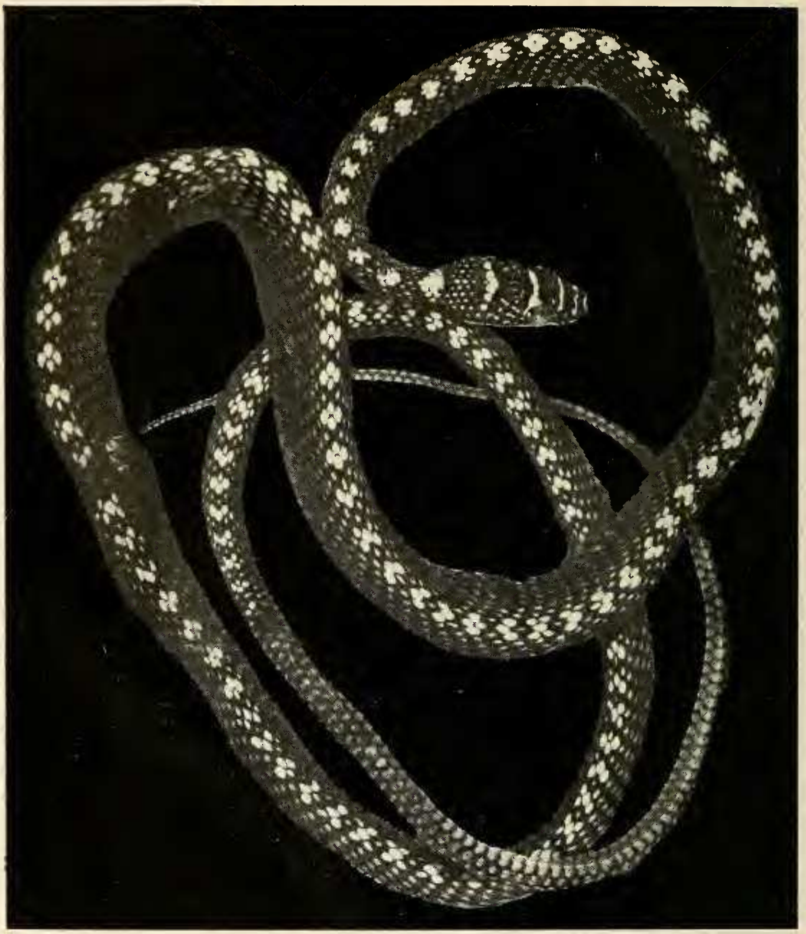

FIG. 73a. *Chrysopelea paradisi* Boie. EHT-HMS No. M 322, 2 km. Northeast Kota Tinggi, Johore, Malaya. Actual total length, 774 mm.; tail, 218 mm.

Chrysopelea ornata (Shaw)

(Fig. 74)

Coluber ornatus Shaw, General zoology or Systematic natural history, vol. 3, pt. 2, 1802, based on Seba's *Jaculus Amboinensis perelegans* vol. 2, pl. 7, fig. 1; *Serpens Ceilanica pomposa veste ornata*, vol. 2, pl. 61, fig. 2, and *Serpens Ceilonica elegantissima* Seba, vol. 1, pl. 94, fig. 7. (type-locality "native of some of the West-Indian islands, Martinico et. [*ex errore*] and according to Seba, of the East-Indian islands Ceylon and Java").

Crysopelea ornata: Boie, Isis, 1827, pp. 526, 546; Duméril, Bibron and Duméril, Erpétologie générale . . . vol. 7, pp. 1042-1045; Günther, The reptiles of British India, 1864, p. 298; Boulenger. The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 371-372; Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 196-198 *(part.)*; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 1, 1914, pp. 175-176 (Bangkok); Bull. Raffles

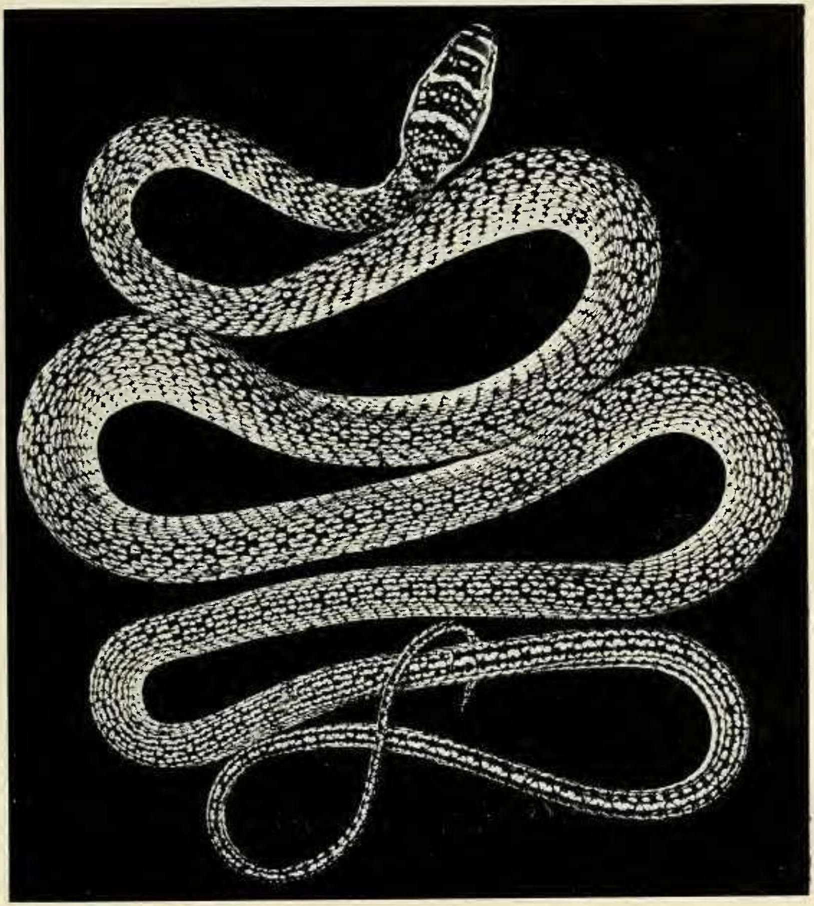

FIG. 74. *Chrysopelea ornata* (Shaw). No. 35127, Udon Thani, Udon Thani province. Actual total length, 1054 mm.; tail, 323 mm.

Mus., no. 3, 1930, p. 66; Rec. Indian Mus., vol. 42, 1940, p. 482; Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 33; Bourret, Les serpents de l'Indo-Chine, 1936, p. 321; M. Smith, the Fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 251-254, fig. 86 and 87, B.

Chrysopelea ornata ornatissima Werner, Sitz. Akad. Wiss. Wien, 134, 1925, p. 61 (type-locality, Ankor Wat, Cambodia).

Diagnosis: (See key.)

Description of species (from No. 607, Hua Hin, Prachuap Khiri Khan): Rostral more than twice as wide as high, upper part bent narrowly back above snout; internasals broader than long; prefrontals broader than long, double the area of the internasals; frontal somewhat bell-shaped, longer than wide, its length equal to its distance from tip of snout, shorter than parietals; nasal divided, loreal three times as long as high; preocular large reaching upper level of head, touching frontal on right side; supraoculars as long as frontal, slightly less wide; two postoculars, upper twice size of lower; temporals, 2 + 2 + 2, upper primary temporal touching both postoculars; five scales between the two upper tertiary temporals; supralabials, 9-9, fifth and sixth bordering orbit; infralabials, 10-10, first five bordering first chinshields which are shorter than second pair; latter touching one another only anteriorly.

Scalerow-formula: 25 (occiput), 17, 17, 13; scales smooth with paired apical pits; ventrals, 222, last one divided; anal divided; subcaudals, 140 paired; both ventrals and subcaudals sharply keeled and more or less notched.

Color in life: Head with narrow greenish yellow and wider black transverse bands; broad parietal band flecked with greenish yellow; chin and supralabials ivory, bordered above by a black line; body greenish yellow each scale with a median black line and a black edge, lines tending to be continuous on back; anteriorly edges of some scales have a wider black border thus producing narrow irregular dark transverse bands; ventrals and subcaudals greenish yellow with small black dots lateral to keel, becoming larger on tail, and a second caudal series of black spots opposite preceding spots but close to inner edge of keel.

Measurement in mm.: Total length, 1068; tail, 330; width of head, 14; length of head, 24.

Variation: There is considerable variation in the coloration of this species. In Ceylon specimens the body as well as the head is banded in black and yellow green, at least anteriorly, with often a series of red or orange dorsal flower-shaped spots. However, Thai specimens I have examined generally follow the above described pattern. Ventrals (*fide* Smith 1943) vary between 213 and 234; subcaudals, 110 and 140, in Thailand and Indo-China.

Distribution: This species occurs widely in Thailand, my specimens being from Prachuap Khiri Khan, Pattani, Chiang Mai, and Udon Thani. It has been reported from Narathiwat, Trat and Koh Chang, an island in the Gulf of Siam. Also widespread in Ceylon, India, Burma and Indo-China.

Subfamily HOMALOPSINAE Jan

Homalopsinae Jan, Elenco sist. ophid., 1863, p. 74.

Diagnosis: Nostrils valvular, on upper surface of snout. Hypapophyses developed throughout the vertebral column; maxillary teeth decreasing in length posteriorly followed by grooved poison-fangs. Tails not compressed.

This subfamily is confined to southeastern Asia, the Indo-Australian Archipelago, Australia, and the South Pacific Islands.

Representatives of six of the Asiatic genera occur in Thailand and two others, *Fordonia* and *Cantoria* I believe doubtless will be discovered along the west coast, since both have a range from Burma to Malaya; *Cantoria* extends into the Indo-Australian Archipelago, and *Fordonia* is known in Cochin China. The presence of *Gerarda* east of the Malay peninsula is reported here for the first time. The homalopsine snakes are often encountered at mouths of rivers near the sea, or in mangrove areas.

These genera may be differentiated by the following key:

KEY TO THAI GENERA * OF HOMALOPSINAE

1. A pair of soft rostral appendages; scales keeled, the ventrals rather narrow and laterally angulate; two species .... *Erpeton*
   No soft rostral appendages 2
2. Ventrals rather wider without lateral keels; eyes moderate 3
   Ventrals narrower; body scales smooth with a lateral keel; scalerows 37 to 43, the scales on sides largely separated from each other by skin; eyes very small .... *Bitia*
3. Nasal shields forming a median suture 4
   Nasal shields separated by an internasal 6
4. Parietals whole; scales smooth or keeled 5
   Parietals broken up; scales keeled .... *Cerberus*
5. Scales smooth .... *Enhydris*
   Scales strongly keeled .... *Homalopsis*
6. Scales in more than 17 rows 7
   Scales in 17 rows, body rather short; head not distinct from neck; tail short .... *Gerarda*
7. Scales in 25-29 rows; body short .... *Fordonia*
   Scales in 19 rows, body elongate .... *Cantoria*

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* *Fordonia* and *Cantoria* have not been taken in Thailand but probably occur.

Genus *Enhydris* Sonnini and Latreille

Enhydris Sonnini and Latreille, Histoire Naturelle des reptiles, vol. 4, 1802, p. 200 (type of genus, *caerulea* = *enhydris*).

Hypsicophis Fitzinger, Systema reptilium, 1843, p. 25 (type of genus, *plumbea*).

Diagnosis: Body cylindrical, head somewhat flattened; scales in 19-33 rows; head not or slightly distinct from neck; eye small, pupil vertical; nasals in contact behind rostral; one preocular; one postocular; undivided internasal; a loreal present; scales smooth in 19-31 rows; ventrals widened, subcaudals and anal divided; a suture from nostril to first labial. Maxillary teeth, 10-16, followed by a pair of somewhat enlarged grooved fangs.

Of the genera belonging to the family Homalopsinae, most are monotypic. *Enhydris*, however, has some 17 recognized species that are distributed throughout southern and eastern Asia, the Indo-Australian Archipelago and northern Australia.

Key to Thailand Species of *Enhydris*

1. Scales in 19 rows, olive to olive-black above; two or three outer scalerows, usually yellow; yellow or white below........................*plumbea*
Scales in 21-29 rows.. 2
2. Scales in 27 or 29 rows; loreal touching internasal; greenish black to olive with yellowish transverse bars or series of spots; below yellow, dark color of back tending to form rings across venter....................*bocourti*
Scales in 21-23 rows.. 3
3. A low ventral count (118-145)................................. 4
Ventral count higher. Scales in 21 -(23) rows ventrals 141-174; general color pattern above consisting of darker and lighter longitudinal stripes; three darker stripes on yellowish venter......................*enhydris*
4. Scales in 21 rows, ventrals 118-121; black with lighter dorsal reticulum and cross-bars or rings..*smithi*
Scales in 21 rows; ventrals 116-145. A median dark stripe from head developing indefinite paired spots................................*jagori*

Enhydris plumbea (Boie)

(Fig. 75)

Homalopsis plumbea Boie, Isis, 1827, p. 560 (type-locality, Java); Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 346, pl. 13, figs. 12, 13; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 948.

Hypsirhina plumbea: Gray, Zoological miscellany, 1842, p. 66; Günther, The reptiles of British India, 1864, pp. 280-281; Theobald, Journ. Linn. Soc., Zoology, vol. 10, 1868, pp. 57-58; Tirant, Notes sur les reptiles et les Batraciens de la Cochinchine et du Cambodge, 1885, pp. 40-41; Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 376, figs.; Catalogue of the snakes in British Museum, vol. 3, 1896, pp. 5-6; Flower, Proc. Zool. Soc. London, 1899, p. 675; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia; 1912, p. 160; Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, Mar. 1915, pp. 156, 185 ("near Bangkok," "Sai Yoke district"); *ibid.*, vol. 1, no. 3, p. 213; Annandale, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 2, Dec. 1916, pp. 91 (Sea of Singgora); de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 181; Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 2, Dec. 1916, p. 162.

Enhydris plumbea: Pope, The reptiles of China, turtles, crocodilians, snakes and lizards: Nat. Hist. Central Asia, 1935, p. 315, fig.; Bourret, Les serpents de l'Indochine, 1936, p. 276. (Good recent literature list); Smith, The reptiles of British India, Ceylon and Burma . . . Reptilia and Am-

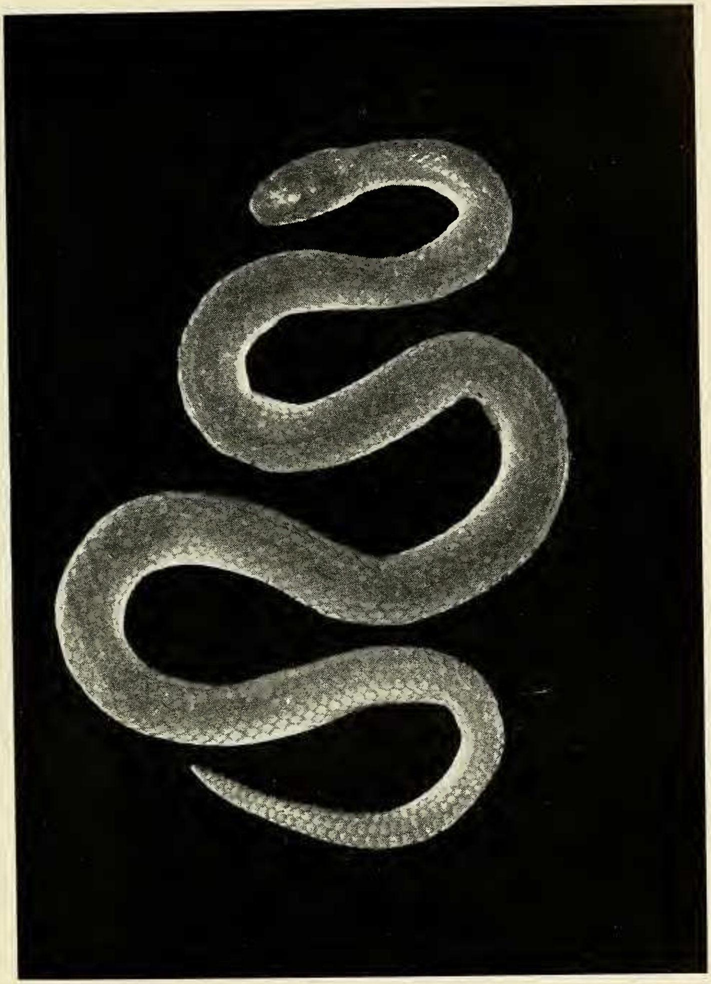

FIG. 75. *Enhydris plumbea* Boie. No. 34238, Bang Saen, Chon Buri, southeastern Thailand. Actual total length, 302 mm.; tail, 40 mm.

phibia, vol. 3, Serpentes, 1943, pp. 282-283, fig. 122; Tweedie, The snakes of Malaya, 1954, p. 84, fig. 21, a; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1159.

Hypsirhina hardwickii Gray, Illustrations of Indian zoology, vol. 2, pl. 87, fig. 1 (type-locality, Penang).

Diagnosis: Small species reaching length of about 400 mm. Scales in 19 rows at middle of body; internasal single, not touching loreal. Dark blackish olive, three outer scalerows usually yellow; below yellowish.

Description of species (from No. 34238 ♀, Bang Saen, Chon Buri): Rostral twice as wide as high, angular above; nasals large, narrowly in contact behind rostral; transverse nostrils connected by suture to second labial; internasal single, wider than long, not touching loreal; prefrontals distinctly smaller than nasals, broader than wide; frontal pentagonal, sides parallel, length nearly equal to its distance from tip of snout, shorter than parietals; loreal a little higher than long; one preocular not reaching frontal; two postoculars, both in contact with first temporal; temporals, 1 + 2 + 2 (1 + 2 + 3); eight supralabials, fourth and fifth bordering orbit; ten infralabials, five touching first chinshields which are longer than second pair; latter separated by pair of scales; mental small, triangular; scale formula: 25 (occiput), 19, 19, 15. Ventrals, 122; subcaudals, 34; anals, 2.

Color in life: Generally greenish-olive, scales slightly darker on edges; head uniform. Three outer scalerows light, the third with upper edges darkened, and with fine grayish powdering elsewhere on scale. Venter ivory becoming yellow-ivory on latter third; broken row of small blackish spots along median line of venter; tail yellowish ivory with a blackish median line; anterior supra- and infralabials with lavender wash over ivory; posterior labials with much yellow; pigment on infralabials chiefly along sutures; eye dull yellow-brown dusted with darker.

Measurements in mm. (Nos. 34238 and 33304): Total length, 302, 272; tail, 40, 40; head-width, 12, 9.6; head-length, 17, 14.8.

Variation: The described specimen is a female and contains seven rather large eggs, none of which show obvious trace of a developing embryo.

A second specimen from Muak Lek, Sara Buri province is a male. In this there is no trace of the pigment on the three outer scalerows, and no spots on the venter. The anterior labials have but little pigment. The ventrals are 132, the subcaudals, 44. The suture from the nostril touches the first labial.

The known range of ventrals is 120-136; of subcaudals, 22-45. The species is called *ngu pla* in the Thai language.

Distribution: The species is widespread in Thailand. It has been taken in numerous localities and probably occurs over much of the country. It occurs also in Burma, southern China, and Indo-China.

Enhydris bocourti (Jan)

(Fig. 76)

Hypsirhina bocourti Jan, Arch. Zool. Anat. Fis., vol. 3, 1865, p. 258, (type-locality, Bangkok, Thailand); Jan and Sordelli, Iconographie générale des ophidiens, vol. 2, livr. 28, 1868, pl. 5, fig. 2; Flower, Proc. Zool. Soc. London, 1899, p. 676; Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 10-11 ("Siam"); A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 161; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 100 (photo and fig.); Bourret, Les serpents de l'Indochine, 1936, p. 290.

Enhydris bocourti M. Smith, Fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 388-389 ("Siam as far north as Paknampo").

Diagnosis: Largest member of the genus. Scales in 27 rows; loreal touching internasal; ventrals, 124-136; maxillary teeth followed by grooved fangs. Head depressed; scales smooth; subcaudals paired.

Description of species (from No. 34490): Rostral a little wider than high, very narrowly visible above as a tiny triangle; nasals in contact on median line, nostril more or less connected by a groove or suture with first supralabial; an azygos internasal posterior to nasals, in contact laterally with loreal; prefrontals small, wider than long, wider than frontal, laterally touching loreal and preocular, normally separated from nasal; frontal two and three-fourths times as long as wide, sides parallel for most of its length; supraoculars wider, and shorter than frontal; latter about as long as its distance from tip of snout, distinctly shorter than parietals; loreal higher than long; a preocular separated from frontal; two postoculars; temporals, 1 + 2 + 3; supralabials, 9-9, fourth bordering orbit, seventh and eighth (or only seventh) divided transversely, sixth highest; infralabials, 15-14, five bordering first chinshields, posterior ones smallest; first chinshields about three times size of second pair which are separated by a pair of scales; mental narrow, triangular.

Scalerow-formula: 32 (occiput), 25 neck, 27 mid-body, 21 preceding vent; scales smooth, imbricate. Ventrals, 138; subcaudals, 34 +; anal, divided.

Color: Above brownish black, most scales with an elongate light spot; a series of narrow transverse light bars across back on eleven median rows of scales, bars usually width of a single transverse scalerow, the bordering scales of the bars black or with smaller light spots; areas between these narrow light rings are darker, and

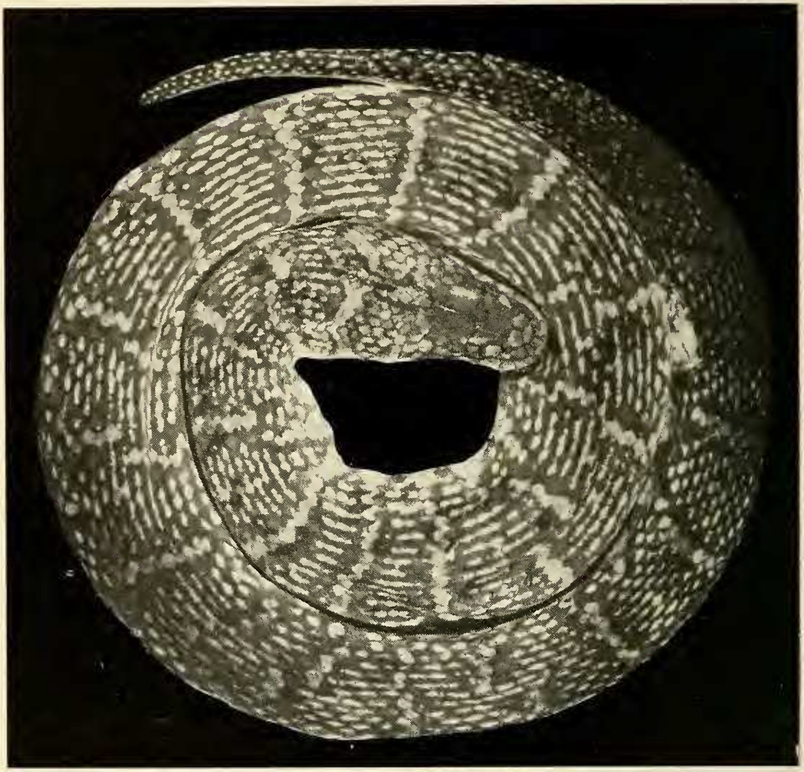

FIG. 76. *Enhydris bocourti* (Jan). No. 34490, Pattani, Pattani province, southern Thailand. Actual total length, 864 + mm.; tail, 102 + mm.

on the sides the lateral parts of two of the dark bands become narrow, forming triangular dark lateral spots from which extends a black bar or stripe about one scalerow in width, which terminates on outer edge of ventrals; from head to tail 31 such bands; lateral triangles with light median spots covering from two to four scales; tail with ten or eleven dorsolateral speckled spots wider than on body; subcaudal area with a median series of elongate dark spots; venter and two or three outer scalerows ivory; edges of scales and ventrals faintly brownish. Head nearly uniform olive above, the scale edges a little darker; supralabials gray on upper parts, ivory on lower parts, the sutures between them black; sutures of some infralabials black with edges of chinshields and adjoining labial edges black; angle of mouth blackish.

Measurements in mm.: (of Nos. 34490 ♀ and 34489 ♀). Total length, 864 +, 807; tail, 102 +, 105; length of head, 55, 53; width of head, 33, 30.

Variation: The largest female in total length measures, 1140 mm.; the tail, 150. The largest male, 620; tail, 100. Ventrals vary between 120 and 140; subcaudals between 36 and 49. The supralabials may be 8-8.

My second specimen (No. 33489 has 140 ventrals, and 40 subcaudals. The coloration is practically identical with the described specimen.

Distribution: In Thailand the species is known from Pattani, and Nakhon Sawan. It has been taken in Bangkok, it also occurs in Cambodia, Cochin China, and the northern part of Malaya.

Remarks: Little is known regarding the effects of the poison of this species but it is not regarded as dangerous to man.

Flower (*loc. cit.*) reports that a female obtained at Kedah in Malaya gave birth to 17 young, their average length being 220 mm. The two specimens from Pattani were obtained by M. L. Pootipong Nupartpat Varavudhi from a pool in that city.

Enhydris enhydris (Schneider)

(Fig. 77)

Hydrus enhydris Schneider, Historiae amphibiorum naturalis et literariae, fasc. primus, 1799, pp. 245-246 (type-locality, Indiae Orientalis [*fide* Russell]).

Hypsirhina enhydris: Günther, The reptiles of British India, 1864, p. 281, pl. 22, fig. k; Boulenger, The fauna of British India, Ceylon and Burma . . . Reptilia and Batrachia, 1890, pp. 376-377; Catalogue of the snakes in the British Mus., vol. 3, 1896, pp. 6-8; Theobald, Journ. Linn. Soc., vol. 10, zoology, 1868, p. 57 (Tonghu, Rangoon); Flower, Proc Zool. Soc. London, 1899, p. 676; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 160; M. Smith, Journ. Soc. Nat. Hist. Siam, vol. 1, no. 2, 1914, p. 100; *ibid.*, vol. 1, no. 2, Aug., 1914, pp. 126-127, 187; *ibid.*, vol. 1, no. 3, Mar., 1915, p. 213; *ibid.*, vol. 2, 1916, p. 162; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 40, 41; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 348; Bourret, Les serpents de l'Indochine, 1935, p. 280.

Enhydris enhydris: Pope, The reptiles of China, 1935, pp. 314-315, pl. 13, figs. D, J; Tweedie, The snakes of Malaya, 1954, pp. 83-84 (Northern Malayan States, Singapore); Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, Mar. 20, 1958, p. 1159; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 383-384.

Diagnosis: One of the larger species of the genus reaching above 800 mm. in total length; scales in 21 (rarely 23) rows; the loreal in contact with the internasal; ventrals, 141-174; markings are longitudinal stripes varying in width and color; below yellow, with three darker lines.

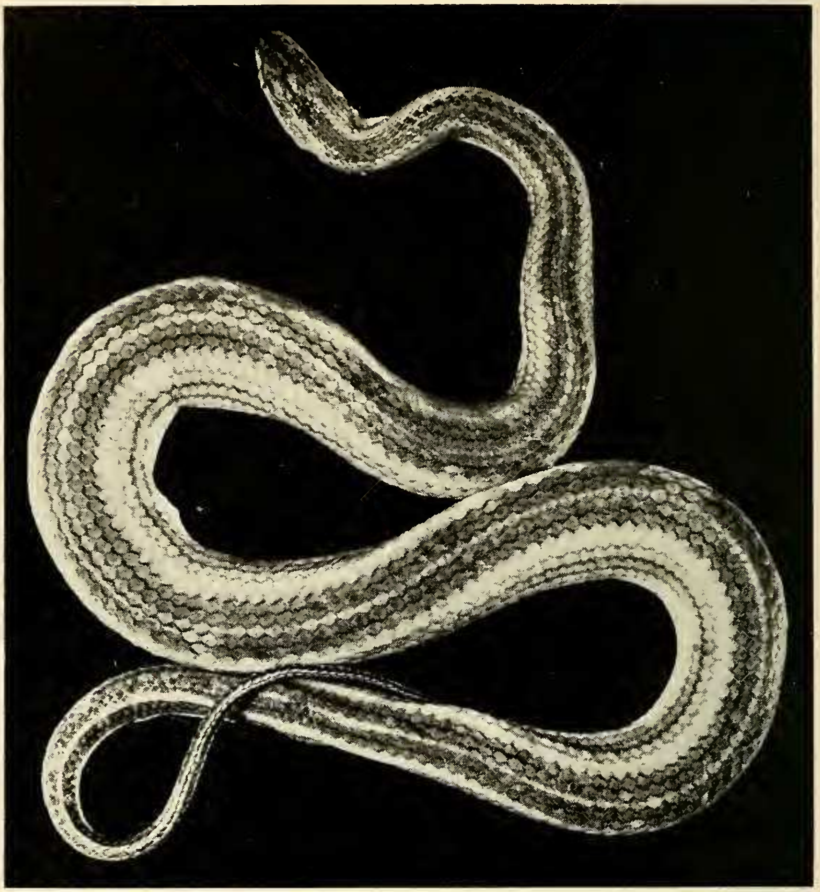

FIG. 77. *Enhydris enhydris* (Schneider). No. 678, Bangkok, Thailand. Total length, 522 mm.; tail, 113 mm.

Description of species (from No. 678): Rostral at least two and one-third times as wide as high, rather narrowly visible above; nasals broadly in contact behind rostral, nostrils (not slitlike) connected by a groove with the first labials; internasal twice as wide as long, in contact laterally with loreal; frontal with sides parallel, pointed rather sharply behind, its length equal to its distance from tip of snout, only slightly shorter than parietals; loreal large, rectangular, touching three anterior labials; a vertical preocular; two postoculars; temporals, 1 + 2 + 3; supraoculars much wider posteriorly; eight supralabials, fourth entering orbit, sixth and seventh largest; nine infralabials, four touching first chinshields; which are shorter and smaller than second pair; latter separated by two pairs of small scales.

Scalerow-formula: 35 (occiput), 25, 21, 21(20). Ventrals, 168; subcaudals, 77; anal, divided. Maxillary teeth, 19(20) + 1, fourth and fifth teeth a little longer and stronger than those preceding the fangs.

Color in life: A broad median gray stripe on body five scales wide, the median scalerow lighter than others; the stripe narrows on neck and at parietals is reduced to a thin line that then widens on frontal to the width of that scale; bordering this broad stripe a narrower light gray stripe on seventh row and parts of two adjoining rows; on neck this is narrowed to two thin lines that outline darker areas on head; on fourth, fifth, and sixth rows a dark gray stripe becoming blackish on tail, that runs forwards on sides of head (including eyes) to tip of snout; three outer scalerows light colored, first, and third nearly white, second gray-white: ventrals yellowish with a gray line on outer edge of ventrals and on edge of first scalerow; another gray line on mid-ventral line; lines on tail blackish and yellowish; dorsal scales with a bluish iridescence.

Measurements in mm. and data on *Enhydris enhydris*

NUMBER*	678♂	679♂	680♂
Total length	522	530	438
Tail	113	118	100
Head, width	10.5	9.2	10
Head, length	17	16.8	17
Ventrals	168	171	164
Subcaudals	77	74	75
Anals	2	2	2
Temporals	1+2+3	1+2+3	1+2+3
Maxillary teeth	19+1 21+1	19+1 20+1	20+1 22+1
Supralabials	8	8	8
Infralabials	9	9	9

* All from Bangkok.

Variation: The ventrals vary between 141 and 174; the subcaudals between 46 and 77. The scales are occasionally in 23 instead of 21 rows. Smith reports a form of this species with three series of indistinct dark spots, a vertebral and two lateral ones extending down the whole length of the back and tail. I have not seen this specimen.

Distribution: The species has been taken in the provinces of Narathiwat, Pattani, Phatthalung, Khon Kaen, and at Bangkok. Since the species is known also from India, Assam, Burma, Indo-

China, South China, Malaya and the Archipelago, it is probably present in the lowlands everywhere in Siam where suitable aquatic conditions exist.

Remarks: It is a fish-eater and for the most part a gentle snake. The number of teeth in the available specimens show this species to have several more than the 10-16 reported by Smith (1943).

Little is known of the effect of the poison of this species on man. D'Abrew writes * of the effects of a bite of this species: "The subject a healthy man of about 36, while attempting to catch the snake, which had previously been irritated, was bitten on the back of the right hand between the thumb and forefinger. There were two distinct punctures and the parts got inflamed at once though scarcely two drops of blood were shed. Fifteen minutes later the hand began to throb, and the throbbing lasted for about an hour, after which no ill-effects were felt. The snake was a little over a foot in length, the place of the occurrence was Parbatipur, Bengal."

A specimen, No. 36307 collected by Dr. Georg Heuser was kept alive. Eleven young, (Nos. 36303-36313) were born July 8, 1959. Their color and markings are very similar to those of the described specimen.

Enhydris smithi (Boulenger)

(Figs. 78, 78a)

Hypsirhina smithi Boulenger, Journ. Nat. Hist. Soc. Siam, vol. 1, 1914, p. 69 (type-locality, Bangkok).

Enhydris smithi; Smith, Journ. Nat. Hist. Soc. Siam, vol. 8, no. 1, Dec., 1929, p. 49; The fauna of British India, Ceylon and Burma including the whole of the Indo-Chinese subregion; Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 385-386.

Diagnosis: Scales in 21 rows; two or three postoculars one of which is the subocular; nasals broadly in contact; loreal touching internasal; temporals, 1 +2 +3(4); ventrals, 118-121; blackish with light cross-bars or annuli.

Description of species (from No. 676 Bangkok): Rostral more than twice as wide as high, sides parallel, well visible from above; nasals large, broadly in contact behind rostral; nostrils transversely lunate, connected by a suture to first labial; internasal single, twice as wide as long, touching loreal; prefrontals as large as or slightly smaller than nasals; frontal one-and-a-half times as long as wide, sides subparallel, not twice width of supraoculars, which are scarcely wider posteriorly than anteriorly; length of frontal equal to its distance from rostral, not or but slightly shorter than parietal;

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* The Journal of the Bombay Natural History Society, vol. 22, 1913, p. 203.

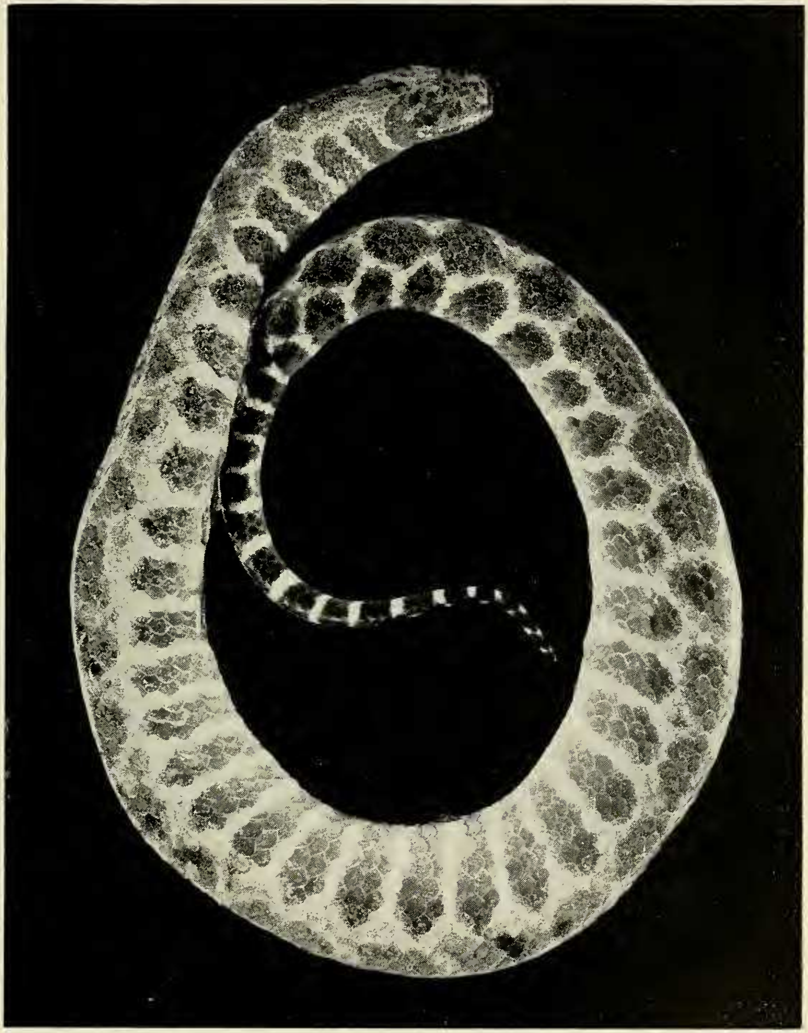

FIG. 78. *Enhydris smithi* (Boulenger). No. 678, Bangkok. Total length, 484 mm.; tail, 93 mm.

one (or two) loreals; a large preocular; two postoculars and a subocular; temporals, 1 + 2 + 4; eight supralabials, fourth touching eye, fifth and sixth touching subocular; mental very small; ten or eleven infralabials, five touching first pair of chinshields which are nearly three times size of second pair (latter separated posteriorly by two scales); seven scales intervene between second pair and first widened ventral.

Scales, smooth, distinctly larger posteriorly on body than anteriorly; the scalerow-formula: at first widened ventral, 35; at 10th, 25; middle of body, 21; before vent, 19. Ventrals, 121; subcaudals, 49; anals, 2; head small; greatest diameter of body about 26 mm.; tail suddenly diminishing in diameter behind vent. A more or less distinct ridge following mid-line of body.

Color in life: On middle of dorsum, a series of 32 dark rounded spots enclosed by a network of gray-lavender that sends down and across venter a series of 34 narrow lavender-gray bars, above, becoming yellowish white low on sides and across venter where they widen somewhat; a series of 34 distinct black lateral bands varying in width from two to five scale-lengths, rather pointed above, extending down and across venter, separated from median series by the gray-lavender ground color, and from each other by the narrow light lines. Tail with 14 black annuli separated by yellow-white narrower bands, the black ones widest posteriorly. Head with a black mark beginning on parietal, curving about jaw-angle and sending forward a branch towards eye; a black median stripe about one inch long on nape; remainder of head, including labials, flecked or clouded with black; a symmetrical dark figure on chin with four lighter areas touching it.

Measurements in mm.: Nos. 676, 677, and Type. Total length, 484, 486, 400; tail, 93, 96, 80; width of head, 15, 14, ?; length of head, 21, 20.8, ?.

Variation: The species is now known from six specimens most of which are females. The ventrals vary between 118 and 127, the subcaudals from 49 to 56.

A second Bangkok specimen in our collection, No. 677, differs considerably from the described specimen in having on the gray brown dorsal background about 42 dark transverse spots (as if two smaller spots were united on back and these sometimes connecting with an irregular line of indefinite dark spots some scarcely larger than a single scale). The characteristic head markings of *smithi* cannot be discerned, the black being scattered unsymmetrically on top and sides of head. There are two yellowish spots on first chin-shields.

The measurements of this male specimen is presented above. The ventrals number 118½, the subcaudals, 53. There are 30 scales on occiput, 23 on neck, 21 on the body, 19 before vent. The lateral black bars number 37, the annuli on tail 21. Both specimens are illustrated.

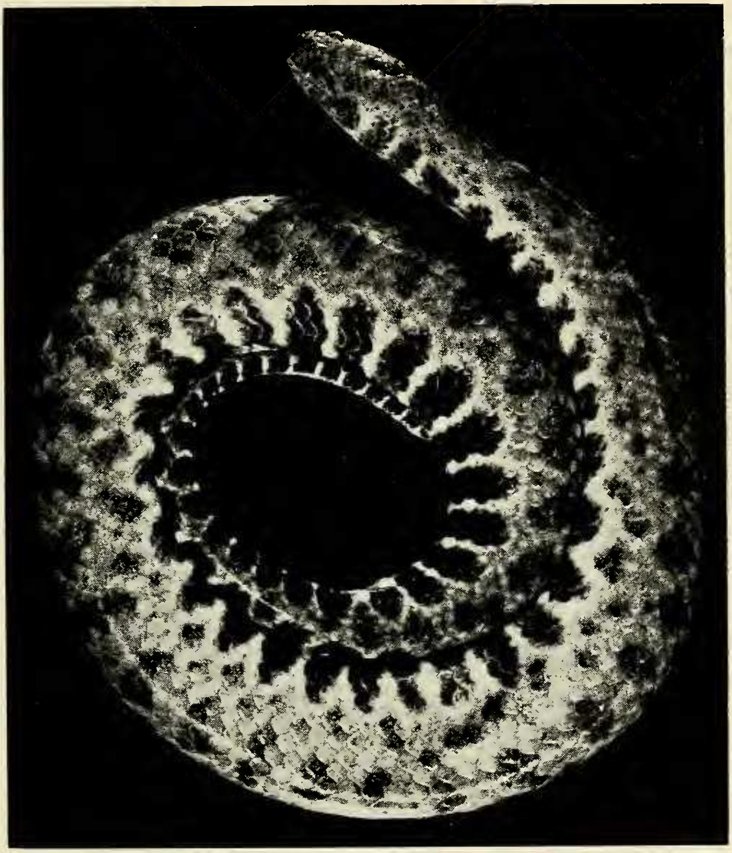

FIG. 78a. *Enhydris smithi* (Boulenger). No. 677, Bangkok (city), Thailand. About natural size.

Distribution: The species is known only from Prachuap Khiri Khan (Hua Hin) and the environs of Bangkok.

Enhydris jagori (Peters)

Hypsirhina (Eurostus) jagori Peters, Mon. Akad. Wiss. Berlin, 1863, p. 245 (type-locality, "Siam").

Hypsirhina jagori: Günther, Reptiles of British India, 1864, pp. 282-283; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, p. 1; Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 6; Flower, Proc. Zool. Soc. London, 1899, p. 676.

Hypsirhina enhydris subtoeniata (sic.) Bourret, Bull. Gen. Inst. Pub. Hanoi, Mar. 1834, pp. 9-10 (type-locality Soc Trang, Cochin, China); Les Serpents de l'Indochine, 1936, p. 282 (also spelled *subtaeniata*).

Enhydris jagori: Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3. Serpentes, Dec. 1943, pp. 384-385.

Diagnosis: Scales in 21 rows; loreal in contact with the single internasal; frontal broader than supraocular; anterior chinshields as large or larger than second pair; a median darker stripe from occiput onto neck soon developing indefinite paired spots, approximately of the area of two scales; a row of lateral spots; first and third scalerows yellowish cream; second row buff salmon; a zigzag line borders ventrals on each side.

Description of species (from No. 34973, from near Udon Thani): Rostral angular, wider than high, visible above; nasals large forming a median suture, their anterior borders curving, the nostril pierced near center; suture runs from nostril to first labial; internasal undivided, much broader than long; prefrontal a little smaller than nasals; frontal about as long as its distance from tip of snout, not as long as parietals, wider than supraocular; loreal longer than high, touching three labials; a single preocular touching two supralabials; two postoculars; temporals, 1+2+3; a pair of scutes behind parietals somewhat enlarged; eight supralabials, the fourth entering orbit; diameter of eye slightly less than its distance from mouth; ten infralabials, first four in contact with first pair of chinshields, which are wider and as long (or nearly so) as second pair; latter separated by two pairs of scales.

Scales smooth, without pits; scale-formula: 33 (about occiput), 23, 21, 19 (before vent), the outer rows scarcely larger than others; ventrals, 146; anal, divided; subcaudals, 65.

Color in life: Above generally grayish brown; a median dark stripe begins on frontal, its edges not regular but covering three to four scalerows, continuing but growing somewhat darker posteriorly. On this develop paired or alternating spots the area of one or two scales; a dim dark stripe continues a short distance on neck, then tends to form small ocellate or "flowerlike" spots on fourth, fifth, and sixth scalerows, the spots separated from each other by a single transverse scalerow; supralabials yellowish cream, the color extending as a line to tail on third scalerow; second scalerow buff to salmon; first row similar to third; edge of ventrals with a grayish zigzag line on each side; a very indistinct series of dots along mid-line; subcaudals edged laterally with a darker gray zigzag line; throat with a dim lavender brown wash; a very indistinct lighter dorsolateral line along latter half of body.

Measurements in mm.: Total length, 418; tail, 87; width of head, 8.8; length of head, 17; greatest diameter of body, 15.

Remarks: The specimen was taken in a dried stream esconsed at the bottom of a footprint of a water buffalo. The specimen is young and is not particularly stout.

Malcolm Smith gives the variation in ventral count as 116 to 145; for subcaudals, 38 to 61.

Genus *Homalopsis* Kuhl and Van Hasselt

Homalopsis Kuhl and Van Hasselt, Alg. Konst. Lett. Bode, vol. 1, 7, 1822, p. 101; Isis 1822, p. 474 (type of genus *Coluber horridus* Daudin).

Diagnosis: Body cylindrical, head distinct from neck, scales small, striated and strongly keeled; ventrals wide; subcaudals paired; eye small with a vertically elliptical pupil. Head covered with large, usually normal, shields (only occasionally scales fragmented); nasals partly divided forming a median suture; internasal usually divided; a loreal present.

Maxillary teeth, 12-13 followed by a pair of rather small, grooved teeth; posterior maxillary teeth smaller than those on anterior part of maxillary.

Only a single species, *Homalopsis buccata,* is recognized in this genus, although several nominal species have been described from the Indian region all of which have been placed in synonymy. The species is widely distributed, being known from Burma throughout southeastern Asia, the Malay Peninsula and Archipelago.

The species is not rare in Thailand, being found commonly, even in the city of Bangkok, about klongs and ponds, fishing in the water or burrowed into mud along their edges.

Malcolm Smith, in the Journal of the Natural History Society of Siam, vol. 2, May 1917, p. 255-256, reports and figures a double-headed specimen. He states, "If my memory serves me rightly similar abnormalities in development have already been recorded twice for this same species."

In 1959 a photograph of a double-headed specimen appeared in a Bangkok newspaper. I later saw this specimen. It was being kept alive in captivity where it was reported as feeding well and keeping healthy. It would seem that the species has a propensity for producing double-headed monsters.

Homalopsis buccata (Linnaeus)

(Fig. 79, 80)

Coluber buccatus Linnaeus, Museum, S. R. M. Adolphi Friderici Regis, p. 29, pl. 19, fig. 3; Systema naturae, 10th Ed., 1758, p. 217 (type-locality, India).

Homalopsis buccata: Schlegel, Essai sur la physionomie des serpens, vol. 2, 1837, pl. 13, figs. 1-5; Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 943; Günther, The reptiles of British India, 1864, pp. 285-286; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, p. 40; Boulenger, The fauna of British India . . . Reptiles and Batrachians, 1890, p. 374, fig. 109; Catalogue of the snakes in the British Museum . . . vol. 3, 1896, pp. 14-15; fig. 1, skull; Flower, Proc. Zool. Soc. London, 1899, pp. 677-679; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 162-163,

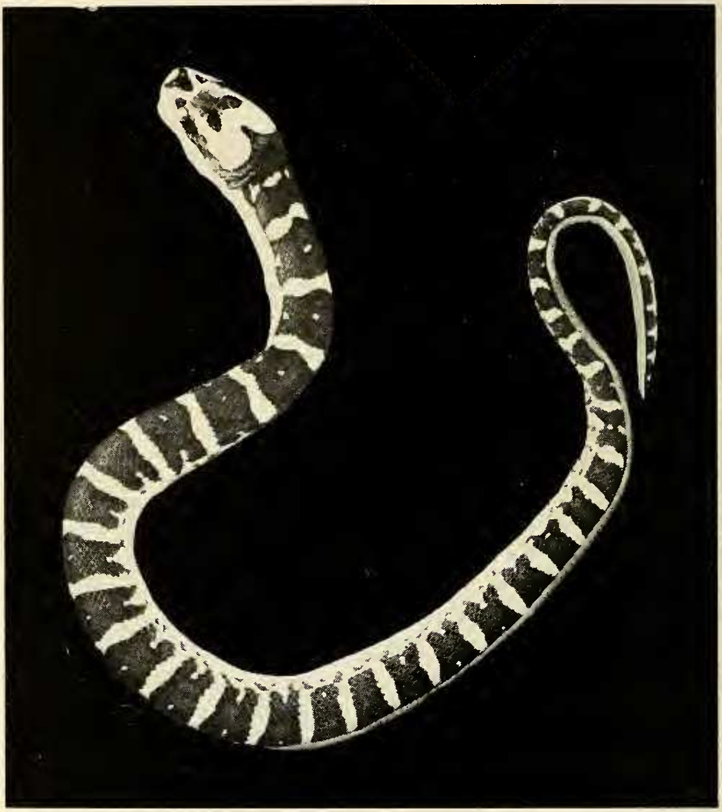

FIG. 79. *Homalopsis buccata* (Linnaeus). No. 3874 yg. ♀, Na Pradoo, Pattani province, southern Thailand. Actual total length, 249 mm.; tail, 60 mm.

fig.; Wall, Journ. Bombay Soc. Nat. Hist., vol. 29, 1924, p. 867; *ibid.*, vol. 30, 1925, p. 817; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 1, 186-187, fig. 69; M. Smith, Journ. Nat. Hist. Soc. Siam., vol. 1, no. 1, Feb. 1914, p. 11; *ibid.*, no. 2, 1914, p. 101; *ibid.*, no. 3, Mar. 1915, pp. 187-213; *ibid.*, vol. 1, no. 4, p. 162 ("Bangnara, Patani"); The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943; pp. 390-392, fig. 123; Bourret, Les serpents de l'Indochine, vol. 2, 1936, pp. 293-294, fig. 117 (literature list); Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38 pt. 2, 1958, pp. 1160-1161, fig. 32.

Coluber monolis Linnaeus, Systema Naturae, 10th Ed. 1758, p. 220 (type-locality, "America" (*ex errore*).

Coluber subalbidis Gmelin, Systema Naturae, 1788, p. 1103 (based on Seba, vol. 2, pl. 21, fig. 3).

Coluber horridus: Daudin, Histoire naturelle des reptiles, vol. VII, 1803, p. 71 (based on Seba's Serpent d'Amerique).

Homalopsis hardwickii Gray, Zoological miscellany 1842, p. 65 (type-locality, India).

Homalopsis semizonata Blyth, Journ. Asiat. Soc. Bengal, vol. 24, 1855, p. 187 (type-locality, Martaban, Calcutta).

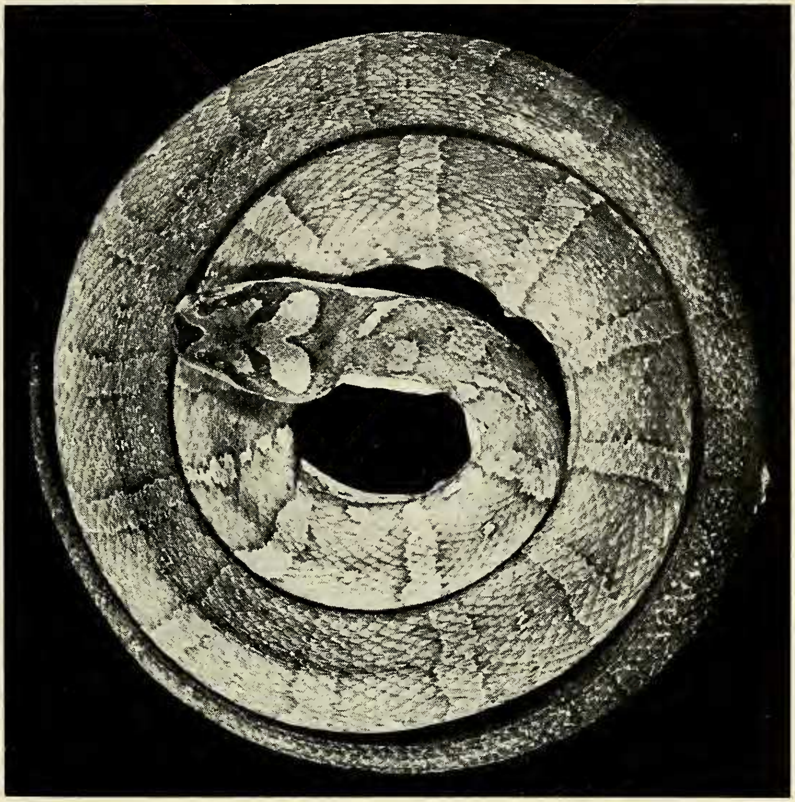

FIG. 80. *Homalopsis buccata* (Linnaeus). No. 34485, Pattani, Pattani province, southern Thailand. Actual total length, 944 mm.; tail, 230 mm.

Diagnosis: Generic characters. Frontal often broken, often narrower than supraocular; one or two loreals; one to three suboculars, separating labials from eyes; chinshields in a transverse row; number of scalerows variable, 37-47; labials often broken transversely.

Description of species (from No. 34485, Pattani): Snout broadly rounded anteriorly. Rostral considerably wider than high, narrowly visible above; a pair of large, partially divided nasals, broadly in contact mesially; nostrils lunate, dorsal; a pair of very small subtriangular internasals; prefrontals three to four times as large in area as internasals, in contact laterally with nasal, loreal, and preocular; frontal slightly wider but distinctly longer than supraoculars, broken transversely (abnormally) into two parts, shorter than its distance from tip of snout, considerably longer than parietals; loreal elongate, twice as long as wide touching three supralabials, a nasal, and a preocular; one or two preoculars, three or four suboculars, two postoculars; temporals, 2+4+6, 2+3+6; supralabials, 13-13, the first seven or eight vertically elongate, last ones smaller, shorter. Mental small triangular; a pair of elongate infralabials in contact behind mental; only a single elongate pair of chinshields, in contact with three or four infralabials, and an elongate scale on outer border of each shield; 17 or 18 infralabials, last six very small.

Scale-row formula: 50 (occiput), 41, 39, 27, scales striated and keeled except one to three outer rows. Keels tuberculate or knoblike on sides above vent. Ventrals, 165; subcaudals, 88, divided; anal scale, divided; ventrals and subcaudals longitudinally striate. Eye small, its diameter about equal to its distance from mouth.

Color: Young: brownish black above with 27 narrow ivory-white transverse bands around body, dividing dorsal color into 28 large blotches each partly or completely divided by a very narrow light ring or a few white spots; 17 major light bands and a similar number of very narrow (or dotted) transverse lines between them; a broad chevron on occiput, nearly divided mesially, some lighter areas above and behind eye; a V-shaped white mark on snout; supralabials and three or four outer scalerows, except first, ivory; chin, lower lips, and venter ivory with black dots on outer edges of ventrals; subcaudal region blackish; a black band across anal scale.

Adults: The light bands are gray-brown edged with dark brown; dorsal blotches an intermediate brown. The row of ventrolateral spots partly on ventrals, partly on outer scalerow. Subcaudal area mottled ivory and dark brown. Markings on head largely dark brown.

Measurements in mm.: Total length, 944; tail, 230; width of head, 26.5; length of head, 33.

Variation: The suture partially dividing the nasal runs from the nostril to the first labial. The internasal in some populations is a single scale, while occasionally the prefrontals may be separated by an azygous scale. Fragmentation of the frontal is usually in the posterior part. The loreal may be divided into two parts, and is never in contact with the internasal. Most of the posterior supralabial scales bordering the lip are really only the lower parts of divided supralabials, the upper parts being regarded as temporals.

Malcolm Smith records the variation in ventral-subcaudal counts as follows: 160 to 170 ventrals for males and females; subcaudals, males, 78-103; for females, 70-91. Variation in scalerows at the middle of the body is 43 to 47, the usual number being 45.

Distribution: In Thailand the species occurs widely about the mouths of rivers, usually in areas affected by tides and tidal waters. It is not uncommon near Bangkok. Elsewhere the species is known in similar situations in southern Burma, Cambodia, Malaya, and the Indo-Australian Archipelago.

Genus *Cerberus* Cuvier

Cerberus Cuvier, Règne animal, 2nd Ed., vol. 2, p. 81, (type, *Coluber cerberus*).

Hurria Daudin, Mag. Encyclop. vol. 5, An. 8, (1802), p. 434 (type, H. *schneideriana* = *cerberus*).

Diagnosis: Body more or less cylindrical, scales strongly keeled, and with longitudinal striations; scales in 21-27 rows, reducing to 17 before vent; nasals in contact; two internasals, two prefrontals; frontal small; supraoculars relatively large; parietals broken into small scales; two loreals; one preocular, one postocular; two suboculars separating labials from eye; eleven supralabials; ventrals widened, 12-17 maxillary teeth, the last two enlarged, grooved.

A single species is known.

Cerberus rhynchops (Schneider)

(Fig. 81)

Hydrus rhynchops Schneider, Historia Amphibiorum . . . vol. 1, 1799, p. 246 (Based on Russell's Indian Serpents, pl. 17 [*Hydrus cinereus* (1802) of Shaw, and *Coluber cerberus* Daudin (1803) are based on the same plate]).

Homalopsis rhynchops: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 941.

Cerberus rhynchops: Günther, Reptiles of British India, 1864, p. 279; Anderson, Proc. Zool. Soc. London, 1876, p. 179; Murray, Zool. Sind., 1884, p. 381; Tirant, Notes sur les reptiles et les batraciens de l'Indochine et du Cambodge, 1885, p. 40; Boulenger, The fauna of British India, Ceylon, and Burma; Reptilia and Batrachia, 1890, pp. 374-375; Catalogue of the snakes of the British Museum, 2nd Ed., vol. 3, 1896, pp. 16-18, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia; 1912, pp. 163-164; Wall and Evans, Journ. Bombay Soc. Nat. Hist., 1900, pp. 345, 612; Alcock and Rogers, Proc. Roy. Soc. London, 1902, p. 449; Annandale, Journ. Asiat. Soc. Bengal, 1905, p. 176; Mem. Ind. Mus., vol. 5, 1915, p. 170; Wall, Journ. Bombay Nat. Hist. Soc., vol. 16, 1905, p. 307; *ibid.*, vol. 26, 1919, p. 89, pl—; Wall, Ophidia Taprobanica or the snakes of Ceylon, 1921, pp. 257-262; Bourret, Les serpents de l'Indo-chine, vol. 2, 1936, p. 295; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, No. 2, 1914, p. 102; *ibid.*, no. 3, p. 213; M. Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 393-394 (synonymy).

Hurria rhynchops: Wall, Journ. Bombay Nat. Hist. Soc., vol. 29, 1924, p. 867; Prater, *ibid.*, vol. 30, 1924, p. 171; Stejneger, Herpetology of Japan, 1907, p. 304.

Diagnosis: Characters of genus. Scales in 23-25 rows; a suture from nostril to first labial; frontal small.

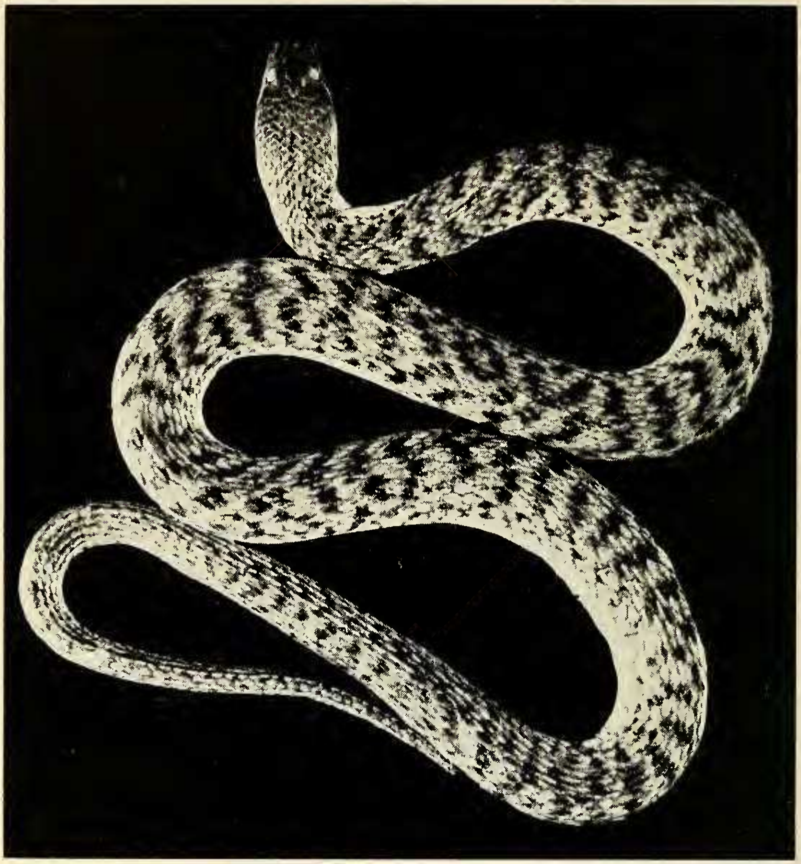

FIG. 81. *Cerberus rhynchops* (Schneider). No. 33521, Ang Hin, Chon Buri province, southeastern Thailand. Actual total length, 470 mm.; tail, 85 mm.

Description of species (from No. 33521, Ang Hin, Chon Buri): Rostral with parallel sides, as high or slightly higher than wide; nasals large, in contact behind rostral; nostrils transverse and lunate, with valves; a suture from nostril to first labial; internasal divided into two triangular moieties, in contact laterally with two loreals; a pair of preoculars, unequal, longer than wide; frontal triangular, symmetrical, small (may represent only a portion of the scale); parietals broken up into scales similar to occipital scales; two loreals, the lower largest; one preocular, one postocular; two suboculars touching one another below eye, separating labials from orbit; two large anterior temporals, (the upper may represent a portion of parietal), three secondary and three tertiary temporals;

eleven supralabials, line of the mouth turning up suddenly behind eighth, fifth and sixth below eye, all relatively high; eleven infralabials, four bordering first pair of chinshields, which are likewise bordered by a scale nearly as long as chinshield itself; second pair of chinshields small and separated by paired scales; eight or nine scales between first chinshields and first ventral.

Scalerow-formula: 27 (occiput), 25, 25, 17, scales striate with a strong keel. Ventrals, 148; subcaudals, 56+; anals, 2.

Color in life: Above, dorsum largely olivaceous gray with a series of about 65 indefinite black crossbars; three outer scalerows ivory or yellowish, with occasional black flecks on first and third rows; ventrals olive-gray with considerable yellow on outer parts of ventrals; subcaudal area grayish black becoming denser towards tip; labials yellow-ivory, most scales with a black spot. Chin flecked with dark pigment; more or less distinct black line from side of snout through eye extending back on side of neck for some distance.

Measurements in mm.: Total length, 470; tail, 85; width of head, 13.8; length of head, 21.

Variation: Considerable variation obtains in various populations of this species—variations that have to do with the degree of development of the frontal, the presence of one or two loreals, the relative size of the temporal scales, and the number of the ventrals and subcaudals. It is not certain that any of these variants require nomenclatorial designation.

Distribution: The species is coastal and is to be found on all Thai coasts. It is common in the soft mud in mangrove areas. In the fishing village of Yahling near Pattani, the snakes were found at night on the edge of the shore especially about houses built at the edge of the sea. At Ang Hin they could be found in mud under the houses.

Outside of Thailand the species is widespread. It is known in India, Burma, Ceylon, Malay peninsula and the Indo-Australian Archipelago.

Remarks: The species may reach a length of one meter. Malcolm Smith (1943) states that it is common about the mouths of rivers, and has been taken in fresh water 100 miles from the sea.

Genus *Bitia* Gray

Bitia Gray, Zoological miscellany, 1842, p. 64 (type of genus, *Bitia hydroides*).

Hipistes Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 77 (type, *fasciatus*).

Diagnosis: Body generally cylindrical, with smooth scales, in 37 to 43 rows; ventrals narrow, about half width of body, keeled laterally; eye small, with vertical or elliptic pupil, directed upwards; head, posterior to frontal largely covered with small undifferentiated scales; labials elevated, separated from eye; nasal divided. Eleven to 13 maxillary teeth followed by two slightly enlarged grooved teeth.

The genus is known to have a single species. It has been reported from Bangkok by Boulenger (1896) on the basis of a specimen received from the "Christiania Museum." The species has not been found by Malcolm Smith or by myself. It is not impossible that the Bangkok record is in error since no other specimen has been taken anywhere in Thailand.

Bitia hydroides Gray

Bitia hydroides Gray, Zoological miscellany, 1842, p. 64; Catalogue of the snakes in the collection of the British Museum, 1849, pp. 63, 78 (type-locality unknown).

Homalopsis hydrina Cantor, Journ. Asiat. Soc. Bengal, vol. 16, pt. 2, 1847, p. 951, pl. 40, fig. 4 (type-locality, Kedah Coast, Malaya). (p. 104 in reprint.)

Hypistes hydrinus: Günther, The reptiles of British India, 1864, p. 287, pl. 24, fig. H; Stoliczka, Journ. Asiat. Soc. Bengal, vol. 29, 1870, p. 207; Anderson, Proc. Zool. Soc. London, 1871, p. 181; Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 381-382, fig. 112; Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 24; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 166; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 400; Journ. Nat. Hist. Soc. Siam, vol. 1, no. 2, Aug., 1914, p. 103; *ibid.*, vol. 1, no. 3, Mar., 1915, p. 214; Tweedie, The snakes of Malaya, 1954, p. 89.

Diagnosis: Characters of the genus. A single internasal separating nasals; a loreal present; scales juxtaposed or subimbricate, in 35-43 rows; tail short, feebly compressed, a subocular present. Ventrals narrow with two keels; nasals divided; parietals broken up.

Description of species: Rostral broader than high, slightly visible from above; internasal single, the scale completely separating nasals; prefrontals forming a median suture, touching loreal, preocular, and supraocular laterally; frontal wider than supraoculars, longer than its distance from tip of snout, somewhat narrowed in middle; parietals broken into small scales not differentiated from those on occiput; nasal completely divided (usually), nostril a narrow slit; loreal rather large touching three labials; preocular and subocular subequal, in contact; suborbital scale prevents labials from entering orbit; postocular small; two anterior temporals; supralabials seven, fourth below eye, fifth and sixth largest, highest;

eyes on top of head directed upwards; ten or eleven infralabials, last five touching anterior chinshields; three posterior pairs of chinshields small; dorsal scales smooth, elongate, usually with a small expanse of skin showing between scales. Scales in 35-43 rows, each scale with two keels; keeled subcaudals, 21-35; anals, 2.

Color: Pale gray above with black cross-bands as broad as interspaces (or a little narrower). Head gray, nearly uniform; outer row of scales white; venter and subcaudal region white. In life, yellow, barred with black, the belly buff.

Measurements in mm.: Total length, 450; tail, 35.

Remarks: The species is presumably rare in Thailand. Whether the Bangkok record is trustworthy may be questioned. However its occurrence in Burma, and in northern Malaya make its presence in the southern part of Thailand almost a certainty.

Genus *Gerarda* Gray

Gerarda Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 77 (type of genus, *Gerarda bicolor*).

Campylodon (not of Cuvier) Duméril, Mem. Acad. Sci. France, vol. 23, p. 499; Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, pp. 963-964 (type of genus, *C. prevostianum*).

Diagnosis: Small snakes, rather cylindrical in form; eye reduced, with vertical pupil; head slightly distinct from neck, with large shields; nasals separated by a single internasal. Scales in 17 rows, reducing to 13 in latter part of body; ventrals widened, subcaudals double. Maxillary elongated beyond palatine, with 11 to 13 teeth, followed after a short diastema by two grooved poison-fangs; 24 to 25 teeth on dentary, subequal.

Only a single species known in the genus.

Gerarda prevostiana (Eydoux and Gervais)

(Fig. 82)

Coluber (*Homalopsis*) *prevostianus* Eydoux and Gervais, Guerin, Mag. Zool. Cl., vol. 3, 1837, p. 5, colored pl. 15 (type-locality, "Manila").

Gerardia prevostiana: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 379; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 20-21; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 616; Wall, *ibid.*, vol. 16, 1905, p. 307; Kloss, Journ. Federated Malay States Mus., vol. 10, 1921, p. 201; Wall, Ophidia Taprobanica, or the snakes of Ceylon, 1921, pp. 262-265, fig. 53; Journ. Bombay Nat. Hist. Soc., vol. 19, 1924, p. 868; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 62; Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 171.

Gerarda bicolor Gray, Catalogue of the snakes in the collection of the British Museum, 1894, p. 77 (type-locality, stated erroneously "West Indies." Suggested by Theobald that this is an error for "East Indies"); Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 1, 1868, p. 421; Theobald, Journ. Linn. Soc. Zool., vol. 10, no. 41, 1868, p. 58; Theobald, Descriptive catalogue of the reptiles of British India, 1876, p. 180.

Heleophis flavescens Müller, Verh. Nat. Ges. Basel, vol. 7, 1894, p. 286, pl. 5, fig. 2 (type-locality, East Indies).

Diagnosis: A species having frontal two-and-a-half times width of supraocular; sides of frontal subparallel, front nearly a straight line; single internasal wider than nasal, constricted near middle, extending a little farther forward than nasals; preocular touching frontal (or not); eight supralabials, fourth entering orbit; second pair of chinshields small, separating a pair of scales; anal divided; first subcaudal single, others divided.

Description of species (from No. 33557 Ang Hin, Chon Buri): Rostral more than twice as wide as high, narrowly visible above, its posterior border with a median concave indentation; nasal scale subround, nostril a transverse lunate slit; internasal slightly wider than nasal, somewhat constricted in middle, its anterior end convex; prefrontals rather large, separated from eye, a little wider than long, touching loreal and preocular, in contact or not with supraocular; frontal (3 × 3½ mm.) five-sided, the sides and front forming nearly straight lines, much shorter than its distance to tip of snout, shorter than parietals; supraoculars less than half width of frontal; loreal about as high as long, touching three first labials; preocular, touching only one supralabial, reaching top of head, touching or separated narrowly from frontal; two postoculars, lower passing partly under eye; a single temporal touches both postoculars; lower anterior temporal pushed back by contact between upper temporal and sixth labial; temporal formula: 2 + 2 + 3 (on one side somewhat irregular); eight supralabials, fourth bordering orbit, seventh definitely largest, eighth smallest; seven infralabials, first four touching first chinshields, which are four times size of second pair.

Scalerow-formula: 22 (occiput), 17, 17, 13, scales smooth and subequal. Ventrals, 145; subcaudals, 34; anal, divided.

Color in life: Nearly uniform gray-olive above; three outer scalerows yellow-ivory, the scales often showing a slight edging of olive. Venter gray, each ventral scale with some ivory or gray-ivory on ends, and this may continue across back edge of scale; subcaudals nearly uniform dark gray below with small transverse areas of ivory; supralabials ivory with olive sutures; chin, throat, and sides of neck yellowish; skin between scales grayish.

Measurements in mm.: Total length, 346; tail, 48; width of head, 9; length of head, 13.

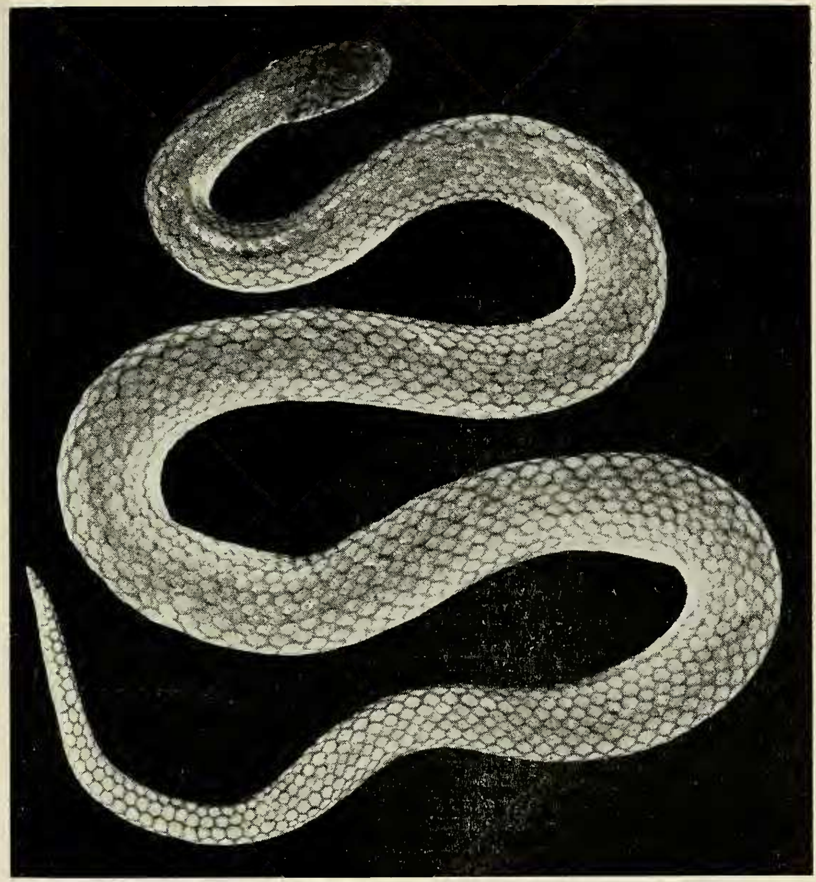

FIG. 82. *Gerarda prevostiana* Eydoux and Gervais. No. 33559, Ang Hin, Chon Buri, Thailand. Actual total length, 458 mm.; tail, 38 mm.

Variation: There are certain differences in the dorsal head scutes of Thai specimens when compared with descriptions and figures of specimens from elsewhere. Unfortunately I have no material from the western or eastern part of the range for comparison.

Distribution: This is presumably the first record of the species from Thailand. It was discovered in mangrove swamps at Ang Hin, where it appeared to be rather common. Fifteen specimens were collected and more might have been taken.

Outside of Thailand the species occurs in Ceylon, the coast of India, Burma and Perak. It will doubtless be found to occur on the western coast of Thailand, if suitable localities exist there.

Genus *Erpeton* Lacépède

Erpeton Lacépède, Bull. Sc. Soc. Philos. Paris, vol. 2, 1800, no. 46, p. 169 (type of genus, *tentaculatum*); Ann. Mus. d'Hist. Nat., vol. 2, 1803, p. 280; Gray, Catalogue of the specimens of snakes in the collection of the British Museum, 1849, p. 62. Duméril, Bibron, and Duméril, Erpétologie générale, vol. 7, 1854, p. 983; M. Smith, Bull Raffles Mus., no. 3, 1930, p. 63.

Rhinopirus Merrem, Tentamen systematis amphibiorum, 1820, p. 81.

Herpeton Wagler, Natürliches system der amphibien, 1830, p. 169; Günther, Proc. Zool. Soc. London, 1860, p. 115; The reptiles of British India, 1864, p. 228; Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, p. 25; M. Smith, The fauna of British India, Ceylon and Burma, Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 400-401.

Diagnosis: Body somewhat depressed covered with keeled scales; head distinct from neck, covered with large regular scutes but with some small scales intercalated and with two scaled tentaclelike processes growing from rostrum; ventrals very narrow, each with two keels; rostral scute separated from nasals by small scales; subcaudal scales not well differentiated. Maxillary teeth, 12-14, followed by two grooved teeth, not or scarcely larger than posterior maxillary teeth.

This genus has been known from a single species that has a relatively small range in Thailand, Cambodia, and Cochin China. It is aquatic, living in ponds, klongs, and slow-moving streams. A second form is described herein. The use of the tentaclelike processes is unknown; they seemingly cannot be moved by the snake, but respond to movements of the water about them. Malcolm Smith (1943) suggests that they might serve as "bait" for the fishes on which the serpent feeds.

Erpeton tentaculatum Lacépède

(Fig. 83)

Erpeton tentaculatum Lacépède, Bull. Sci. Soc. Phil. Paris, vol. 2, no. 46, 1800, p. 169; Ann. Mus. Nat. Hist. Paris, ser. 10, vol. 2, 1803, p. 284, pl. 50 (type-locality not given); Daudin, Histoire naturelle générale et particulière des reptiles, vol. 7, 1803, pp. 246-253, pl. 86.

Herpeton tentaculatum: Günther, Proc. Zool. Soc. London, 1860, p. 114, color plate, 23; Morice, Ann. Sci. Nat. Paris, ser. 6, vol. 2, 1870, pl. 20; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 42-43; Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 25-26; M. Smith, Journ. Nat. Hist. Soc. Siam. vol. 1, no. 2, Aug., 1914, pp. 103-104, and 126-127, pl., fig. (photo of head), (Thai name *ngu kradang*); *ibid.*, vol. 1, no. 3, Mar., 1915, p. 187, and 214; Annandale, Journ. Nat. Hist. Soc. Siam, vol. 2, no. 2, Dec., 1916, pp. 91, 94; Gyldenstolpe, Küngl. Vet. Akad. Stockholm, vol. 55, 1916, p. 19; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 63; Bourret, Les serpents de l'Indochine, 1936, p. 305, fig.; M. Smith, The fauna of British India . . . vol. 3, serpentes, 1943, pp. 401-402, fig. 130, a., b., c. (*part.*).

Homalopsis herpeton Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 359; Abbildungen . . . 1839, p. 50, pl. 16.

Rhinopirus erpeton: Merrem, Tentamen systematis amphibiorum, 1820, p. 82.

Diagnosis: See generic characters above.

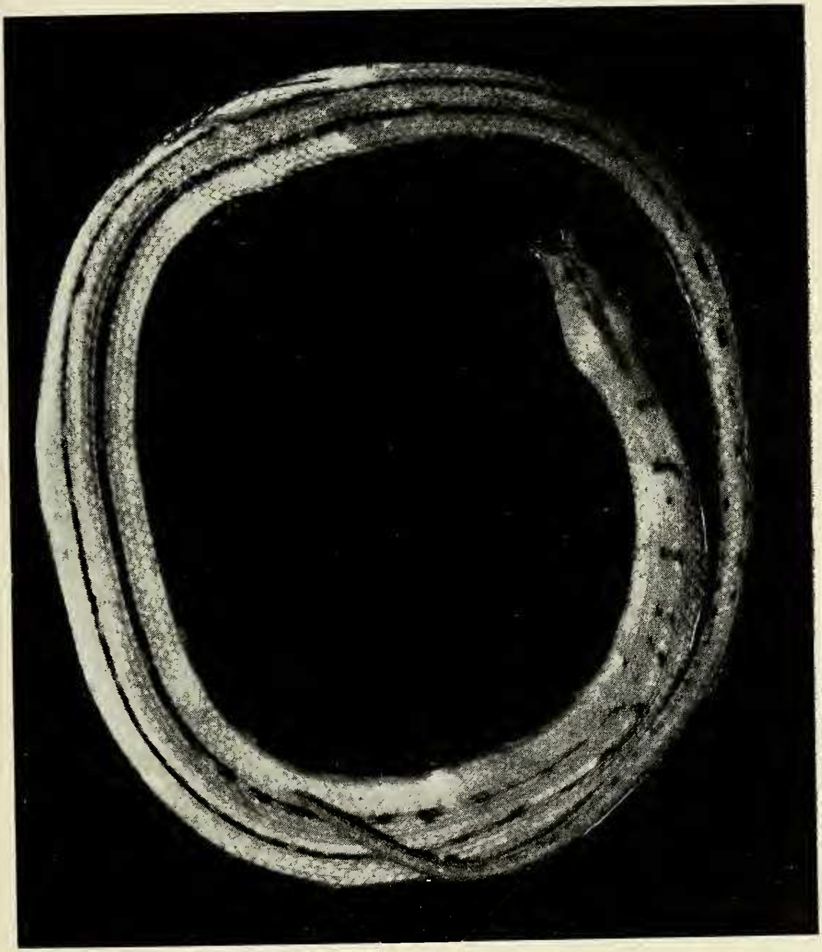

FIG. 83. *Erpeton tentaculatum* Lacépède. EHT-HMS No. 280, environs of Bangkok. Actual total length, 445 mm.; tail, 136 mm.

Description of species (from No. 280): Rostral not twice as wide as high, sides not parallel, notched mesially posteriorly; a median hexagonal postrostral scale flanked by one or more series of small scales completely separating rostral from enlarged nasals; latter scales form a median suture posteriorly, anteriorly partly separated by one small scale; nostril with a valve; nasal partially divided by a suture directed outward and somewhat downward; internasal divided into two equal parts, followed by a third scale touching a loreal; prefrontals about size of nasals, forming a median suture, separated from supraoculars; frontal small, separated from supraoculars by a row of scales (or touching it at a point on right side), shorter than it its distance to rostral, shorter than parietals; parietals form a median suture, border frontal, but touch supraoculars only at a point; from near sides of rostral two tentaclelike processes grow out, covered by ten or eleven rows of scales; seven or eight scalerows around tentacle, the number in a row diminishing distally; 14 supralabials, none bordering orbit; these bordered above by a row of similar scales, three or four of which border eye; a rather large preocular preceded by two or three scales (that might be regarded as loreals) and 16 to 18 smaller scales; three postoculars; these followed by one larger temporal but scales following not differentiated from body scales; twenty infralabials, posterior ones somewhat elongated; first labials do not touch behind small mental; two or three pairs of chinshields, none touching labials. Body scales strongly keeled.

Scale-formula: 50 (across occiput), 36, 32, 26. Ventrals, approximately 116, about twice as large as adjoining scales, first separated from chinshields by 22 scales; subcaudals, 98, paired, but not very clearly differentiated; anal, undivided.

Color: Above light reddish brown; neck with paired spots that tend soon to join and form two narrow blackish lines a little more than one scale wide, separated by five scalerows which are gray becoming darker posteriorly; on tail these break up into a line of small elongate spots; laterally a broader dark-brown stripe, below which is a second similar line two scales wide, dim on neck but extending onto tail and there breaking into spots; venter yellowish with two rows of irregular broken dark spots of flecks extending nearly to tail; an indistinct darker mark extending on to head from neck. Anterior part of venter with slight paired darker spots.

Measurements in mm.: Total length, 445; tail, 136; width of head, 11.6; length of head, 17; width of body, 18; length of tentacle, 5; eye from tip of snout, 6.

Variation: The number of scalerows varies from 35 to 39; the variation in ventrals for males is from 103 to 122; for females, 114 to 116.

Distribution: In Thailand the species is known from Nakhon Si Thammarat (sea of Singgora) and at Bangkok. M. Smith states "Central and peninsular Siam." It occurs also in Cambodia and Cochinchina.

Malcolm Smith states (1943): "It is not uncommon in ponds and sluggish waters in the country around Bangkok if one knows where to look for it, . . ."

Remarks: The species of this genus are unique among the so-called fresh-water snakes in having greatly reduced ventral scales and the tentacular appendages on the snout. In part of the body, one ventral corresponds to one diagonally transverse row of scales. Farther back there may be one row and part of another and later two rows for each ventral scale; the subcaudals are divided. There are two large anals bordered anteriorly by three smaller scales.

Erpeton sp?

(Fig. 84)

In the collection there is a specimen, No. 34150, that differs considerably from the form just described. The differences have to do with color and markings, a larger number of ventrals, some head-scale differences, and the characteristics of the anal region. It was captured at Bangkok. I append a detailed description of the specimen, in the hope that others of the form may be recognized. A figure is given.

Description of type: Rostral more than twice as wide as high, notched below on labial border, excavated on front face, broadly bilobate above; followed behind by a postrostral, which is flanked on either side by a group of six or seven tiny scales separating rostral from the large nasals; latter form a median suture for about half their length, and are partly severed by a suture running laterally from nostril to edge of scale; nasals followed by a small pair of scales, which with a typical pair of prefrontals enclose a small azygous scale; frontal about one-fourth longer than wide, shorter than its distance from tip of snout, shorter than parietals; supraoculars about half width of frontal separated from frontal by a row of small scales; canthus rather distinct; preceding supraocular a scale half its size; a large preocular preceded by a scale nearly as large; eight or nine small scales bordering canthus above; 15-16 supralabials, three enlarged suboculars, three postoculars; 19 to 20 small scales in loreal area; "tentacles" not as long as distance between eye and tentacle; temporal scales small, about seven rows between labials and parietals; twenty infralabials, posterior ones elongate; chinshields not typical, a series of four more or less elongate scales on each side of groove.

Scale-formula: 47, occiput; 41, neck; 39, middle of body; 29, preceding vent, all scales strongly keeled. Scales of occiput and neck small, less than half-, often one-third size of scales around middle of body; vent bordered by a transverse anal, preceded by a pair of overlapping scales. Ventral scales, 125 beginning 28 (trans-

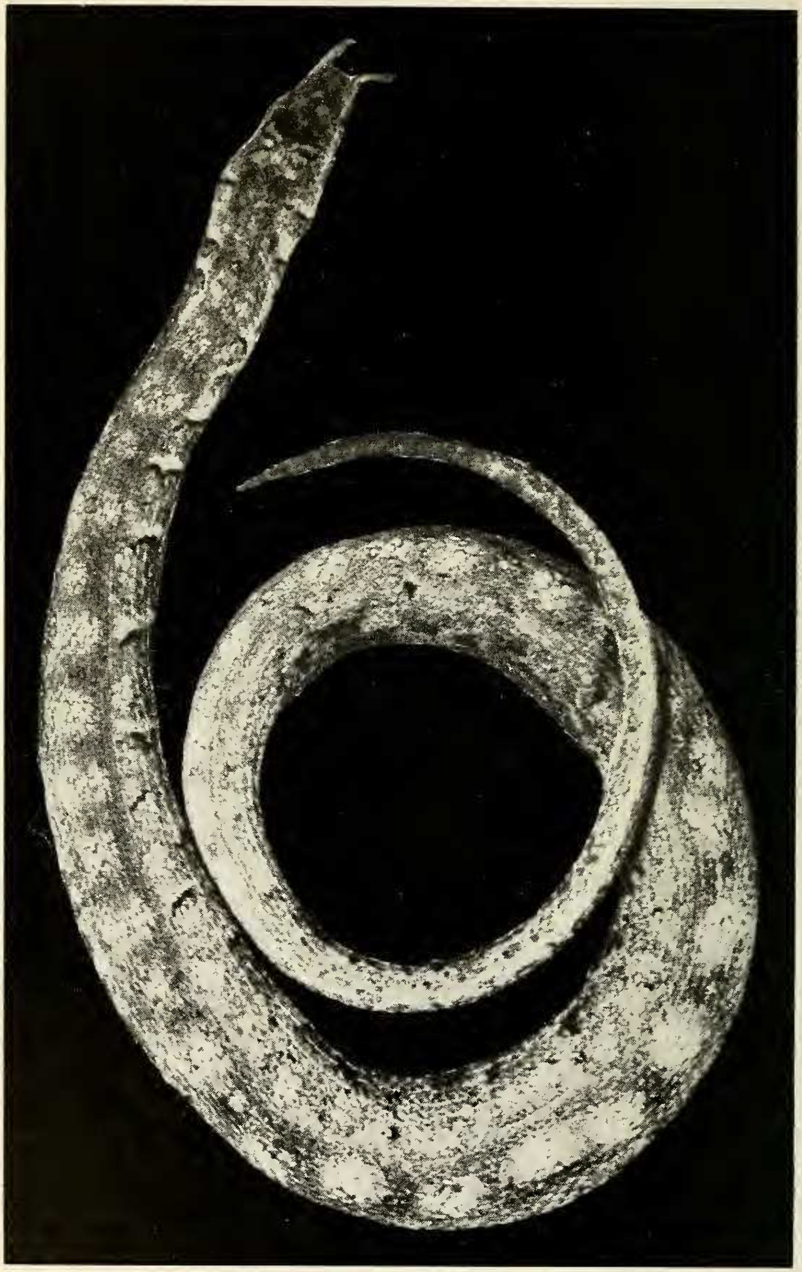

FIG. 84. *Erpeton sp.* No. 34150, from near Bangkok. Actual total length, 392 mm.

verse) scalerows behind mental, but number of transverse rows of scales from first ventral to vent is 141; and transverse rows preceding first widened ventral are 28 to back of head (jaw-angle).

Color: On dorsum and sides of body, generally variegated and mottled lavender-brown without evidence of longitudinal stripes. Top of head blackish brown mottled with indefinite lighter spots; a deep-black lateral stripe covers rostral and entire side of head to behind angle of mouth connecting with a black area covering lower jaw and chin; narrow light lavender lines edged with black, begin on sides of occiput, passing under neck but interrupted mesially below; a postparietal; lighter area edged with black; an ocellated spot below angle of mouth and a pair of similar spots on each side of the mental; on neck and sides of body anteriorly, a series of cream black-edged bars, occasionally touching on venter, becoming indistinct and lost posteriorly. A median series of rather large indefinite gray-lavender spots with a still more indefinite lateral series (see fig.); venter dull blackish generally; indefinite markings on tail; subcaudal area dark, similar to venter.

Measurements in mm.: Total length, 394; tail, 120; width of head, 10; length of head, 17; "tentacle," 4.2.

Remarks: The usual expectation in Colubrid snakes is the presence of one vertebrae to each ventral, and one transverse scalerow for each ventral. This is obviously not the case in this species.

Whether all the cephalic structural characters listed as distinguishing *tentaculatum* from this form are constant, only a study of more specimens of the two forms can tell. They are however easily separated by the anal scales and the color pattern.

FAMILY ELAPIDAE Boie

Elapidae Boie, Isis, 1827, p. 510.

Diagnosis: Grooved poison-fangs at front end of maxillary bone, usually followed by one or more solid teeth; loreal invariably absent. Pupil of eye round. Hypapophyses developed throughout vertebral column. Grooves may be present in certain of the other maxillary teeth.

This family of serpents is distributed in both hemispheres. In proportion to the other terrestrial snakes, Australia has the largest number of the Elapidae.

All members of this group have poisons that are dangerous to man and larger animals, and often lethal; however, many forms are small and the small quantity of venom they are capable of injecting is probably insufficient to be deadly to an adult human being. Fortunately a number of the larger species are unagressive and seem to be reluctant to bite when handled or even when treated roughly.

Entering Thailand are five genera of Elapidae that may be differentiated by the following key:

KEY TO THAI GENERA OF THE ELAPIDAE

1. Very large snakes (to 5.5 meters in length) a pair of large postparietal shields; poison-gland on side of head, poison-fangs followed usually by three solid maxillary teeth; 15 scalerows at mid-body........*Dendraspis*
   Rather large (to nearly two meters), medium, or small snakes lacking enlarged postparietal shields.. 2
2. Medium to small snakes with poison-glands much elongated pushing back into the body-cavity....................................*Maticora*
   Poison-glands confined to head.................................... 3
3. Maxillary bone not extending forward beyond the palatine; vertebral series of scales enlarged in all Thai forms....................*Bungarus*
   Maxillary bone not extending forward beyond the palatine; vertebral series of scales not enlarged.. 4
4. Small snakes, scales in 13 to 15 rows; no elongated nuchal ribs permitting the nuchal skin to be stretched into a "hood". Transverse rows of scales not arranged obliquely..................................*Calliophis*
   Medium snakes with elongated nuchal ribs permitting the nuchal skin to be spread into a "hood". Transverse scalerows obliquely arranged...*Naja*

Genus *Bungarus* Daudin

Bungarus Daudin, Mag. Encycl., vol. 5, year 8(1803), March, p. 434 (Based on Russell's Indian Serp., vol. 1, 1796, p. 3, pl. 3; Histoire naturelle . . . des reptiles, vol. 5, 1803, pp. 263-264, (type of genus, *fasciatus*).

Diagnosis: Head not differentiated from neck; maxillary bone not reaching beyond palatine; poison-fangs followed by from two to four teeth; complement of head shields complete except for loreal; scales smooth; in 13-19 rows; eyes rather small, pupil round; vertebral scales enlarged; usually dorsal vertebrae with lateral expansions connected with prezygapophyses and postzygapophyses. Nostril between two nasals; one preocular, two postoculars; subcaudals usually single.

Some thirteen species are known occupying territory in southern and southeastern Asia. Three species have been reported for Thailand. They may be distinguished by the following key:

KEY TO THAI SPECIES OF *Bungarus*

1. Scalerows, 13 about body; terminal subcaudals paired, other single. Black with an orange-yellow or red median dorsal stripe, and a red orange or yellow head..*flaviceps*
   Scalerows, 15 (rarely 17); subcaudal scales, single throughout; vertebral scales strongly enlarged.. 2
2. Tail ending in a point; dorsal vertebrae do not form a ridge down back. Dorsum, black with 20-25 broad white cross-bars, the median part of each bar spotted with black; 7 to 10 bars on tail; head black above....*candidus*

Tail ending bluntly, often with a swollen tip; spinous processes of vertebrae form a mid-dorsal ridge on body and tail; body alternately banded in black and yellow; a large black mark on nape reaches to between eyes, *fasciatus*

Members of the genus *Bungarus* have come to be known as Kraits. It is the English name generally applied to them in much of the literature. Most members of the genus seem to be very reluctant to bite and when teased do not become angry but continually try to hide their head under their coils or place the snout straight down against the earth. This habit is not confined to species occurring in Thailand. I once asked a Ghurka what the Krait was called in his country (Nepal). He replied, "'good snake' because it never bites.—But if it does it kills you."

Wall (1911) reports that the venom of the banded Krait, is less toxic, than cobra venom, and that there is no recorded case of human beings having been bitten! However he records that a bullock, bitten by a banded Krait, died "about 20 minutes or so later."

However, the bite does kill if sufficient venom is injected despite the fact that fatalities from them are relatively rare.

Bungarus flaviceps Reinhardt

Bungarus flaviceps Reinhardt, Vidensk. Selsk. Skrift., vol. 10, 1843, p. 267, pl. 3. fig. 4 (type-locality, Java).

Bungarus flaviceps flaviceps Reinhardt

(Fig. 85)

Bungarus flaviceps Reinhardt, Vidensk. Selsk. Skrift., vol. 10, 1843, p. 267, pl. 3, fig. 4 (type-locality, Java); Cantor, Journ. Asiat. Soc. Bengal, vol. 15, 1847, p. 1033, or Catalogue of the reptiles inhabiting the Malayan Peninsula (reprint of above 1847) p. 112; Theobald, Journ. Linn. Soc., vol. 10, Zoology, no. 41, May 30, 1868, pp. 63, 67 (Tenasserim); Flower, Proc. Zool. Soc. London, 1896, p. 894; Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 371-372; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 200; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 245; Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 21; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, no. 1, 1923, p. 61 (Nakhon Si Thammarat Mts.); M. Smith, Bull. Raffles Mus., no. 3, Apr., 1930, p. 67 (Nakhon Si Thammarat Mountains, 2000 ft.); Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 36 ("Bang Yai Jang, southwest of Rajaburi"); M. Smith, The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 410-411 ("Siam," Rat Buri); Tweedie, The snakes of Malaya, 1954, pp. 92-93.

Megaerophis flaviceps: Günther, The reptiles of British India, 1864, p. 346; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 33, 63 (separate); Sclater, Journ. Asiat. Soc. Bengal, vol. 60, 1891, p. 57; Bourret, Les serpents de l'Indochine, 1936, pp. 392-393.

Bungarus flaviceps flaviceps: Brongersma, Zool. Meded., vol. 30, no. 1, 1948, pp. 24-27 (excellent literature list and synonymy).

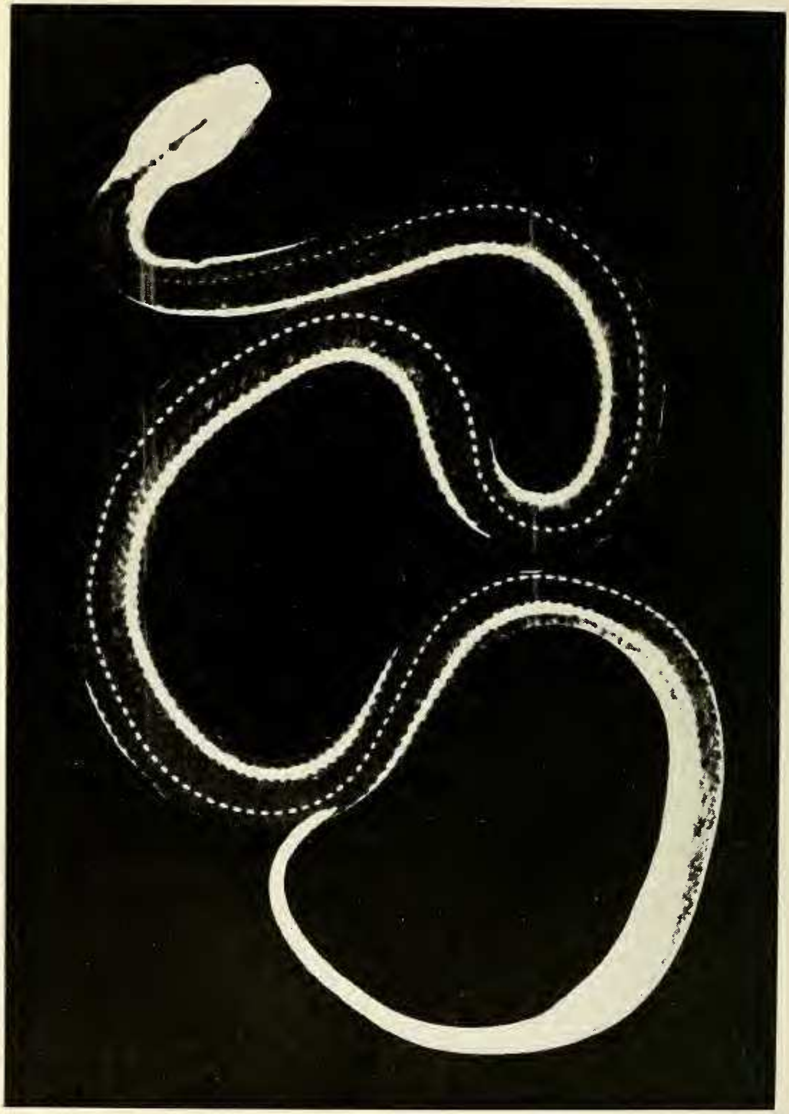

FIG. 85. *Bungarus flaviceps flaviceps* Reinhardt. (Young.) EHT-HMS No. m12, Fraser's Hill, Malaya. Actual total length, 398 mm.; tail, 52 mm.

Diagnosis: Large serpent (to 1850 mm.) with 13 scalerows throughout body; a distinct ridge on middle of back and tail; subcaudals paired. Black above with a red, orange, or yellowish head and tail and with a median dotted line and a lateral stripe of reddish orange or yellow; venter usually brown.

Description of species (from EHT-HMS No. M12, Fraser's Hill, Malaya): Rostral about one and a half times as wide as high, well visible above, its posterior border convex; internasals smaller than prefrontals; frontal hexagonal, sides practically parallel, longer than its distance to tip of snout, equal to length of parietal suture but shorter than parietals; frontal about twice as wide as supraoculars; nostril between two nasals, posterior one a little the larger; one preocular, not reaching top of head; two postoculars; temporals, 1 + 2 + 3; 2 + 2 + 3; seven supralabials, third and fourth border orbit; first infralabials in contact behind triangular mental; six infralabials, four touching anterior chinshields and first ventral.

Nineteen scales across occiput at fifth ventral; 13 scalerows on body as far as vent; scales smooth, the apical pits lacking; ventrals, 224; subcaudals, 54, the first 13 single, the next 40 divided, the terminal one single; anal, single.

Color: Above iridescent black with a series of red or orange spots one on each vertebral scale, but posteriorly fusing and forming a gradually widening stripe that is lost on the red or orange of the tail; a pair of lateral lines passing on outer scalerow and outer half of adjoining row; lower edge of outer row black. Head and neck red or orange as far as eighth ventral; a narrow black line begins on posterior tip of frontal, continues back and joins black dorsal coloration; venter blackish, the posterior edge of each scale somewhat lighter than remainder. The ventrals become lighter 50 scales before vent and farther back gradually become pure red or orange. This continues to end of tail except for a small black spot at tip.

Measurements in mm.: Young; snout to vent, 346; tail, 52; total length, 398; width of head, 9.4; length of head, 10.5.

Variation: Lower parts of the body may be orange or yellow, uniform or the ventrals maybe edged with brown. The lateral stripes are more distinct in the young.

The species is known to reach a total length of 1850 mm., the tail 220 mm. Rarely three postoculars are present. The ventrals of the female vary between 193 and 217; in males, 220-236; subcaudals 42-54; 47-53.

Remarks: The specimen described is a very young specimen, taken on Fraser's Hill, Malaya.

Bungarus candidus (Linnaeus)

(Fig. 86)

Coluber candidus Linnaeus, Museum S. R. M. Adolphi Friderici Regis Svecorum . . . 1754, pp. 32-33, pl. 7, fig. 1; Systema naturae, 10th Ed., 1758, p. 223, (type-locality, India).

Bungarus candidus: Boulenger, Catalogue of the Snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 368-369, (*part.*); Flower, Proc. Zool. Soc. London, 1899, pp. 689-690; Wall, Journ. Bombay Nat. Hist. Soc., vol. 18, 1908, p. 715, pl. 8, fig. 7; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 199-200; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 244-245, fig. 91; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, p. 61; Bull. Raffles Mus., no. 3, 1930, p. 67; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 416-417; Tweedie, The snakes of Malaya, 1954, pp. 91-92; Taylor and Elbel, Univ. of Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1162 (Khorat).

Bungarus semifasciatus Boie, Isis, 1927, p. 552, (type-locality, Java); Günther, The reptiles of British India, 1864, p. 344.

Bungarus caeruleus: Boulenger, The fauna of British India, Ceylon and Burma . . . Reptilia and Batrachia, 1890, p. 388 (not of Schneider).

Diagnosis: Large snake, reaching a length of 1300 mm.; subcaudals, single; tail ending in a point; no dorsal ridge; scales in 15, more rarely 17 rows; anterior temporal longer than high; body with saddlelike blotches on a white or gray-white ground color.

Description of species (from No. 2673 ♂ Khao Chong, Trang, Thailand): Rostral low, narrowly visible above, wider than high; internasals a little more than half area of prefrontals, their suture little more than half that of prefrontals; latter scales angular laterally, each distinctly larger than frontal; frontal small, contained in distance to tip of snout 1.8 times, only half the length of parietals; nostril between two nasals; a preocular; supraocular only a little smaller than frontal; two postoculars; parietals narrow, elongate, nearly twice as long as wide; temporals, 1 + 2 + 3; supralabials, 7-7, third and fourth border eye, fifth and sixth largest; infralabials, 7-7, last small, first three bordering first chinshields, which are longer and wider than second pair. Scale formula: 21 (occiput), 17, 15, 15. Middle scalerow much widened. The nine anterior saddlelike blotches, in order, cover the following number of scalelengths mesially: first, 21, 16, 13½, 12, 9, 7, 5 +, 5, 5; total number of blotches 22 on body, nine on tail. Ventrals, 222; anal, single; subcaudals, 53, undivided.

Color in life: Body white to ivory; top of head grayish black, followed by a chevron-shaped lighter area (in younger specimens) with considerable gray-black on each scale; first blotch touches black of head mesially; a series of iridescent bluish-black saddle-

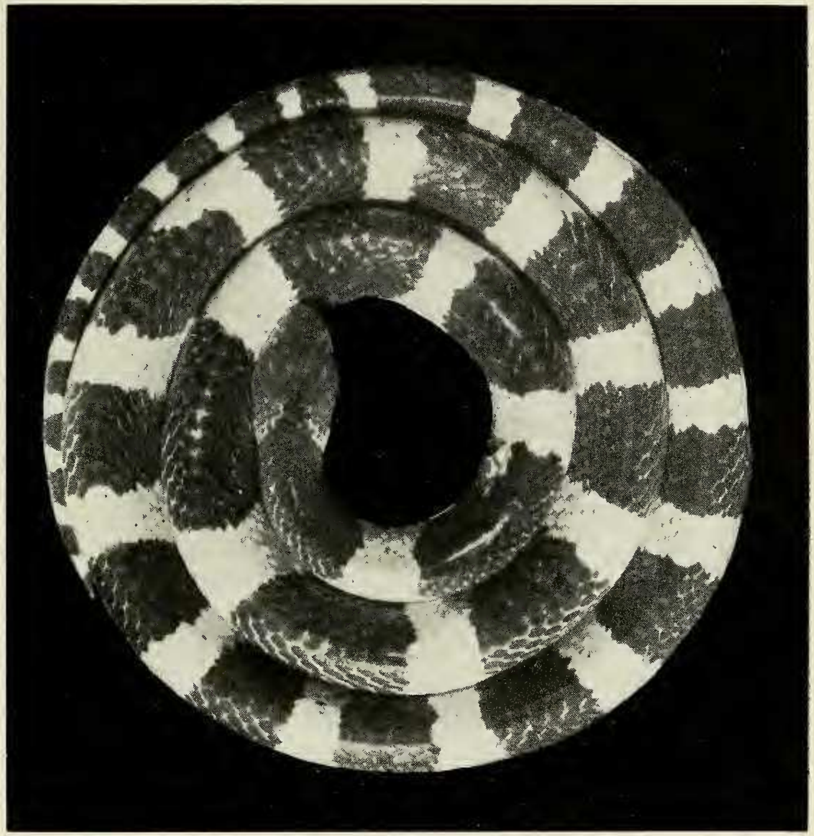

FIG. 86. *Bungarus candidus* (Linnaeus). EHT-HMS No. 2673 Forest Station, Khao Chong, Trang, southern Thailand. Actual total length, 1076.5 mm.; tail, 152.5 mm.

shaped blotches, widest on middle of dorsum, narrowing a little laterally, reaching onto edge of ventrals; intervening light bands narrower on mesial line, widening laterally, the light dorsal scales (except median and outer rows) each with a small black fleck. Venter ivory; toward posterior part of body posterior edges of ventrals with a faint amber shade; a few small subcaudal spots alternating with caudal spots.

Measuremnts in mm.: Snout to vent, 1076.5; tail, 152.5; width of head, 19; length of head, 31.

Variation: The ventrals range is from 194 to 237, the subcaudals from 37 to 56 (*fide* de Rooij). On the mainland specimens the scalerows are 15, while the ventrals range is from 209 to 219; subcaudals, 40 to 50 (*fide* M. Smith).

A specimen from Na Pradoo (P.K. No. 111), differs from the described specimen in certain points. There are 24 dorsal body spots and eight on the tail. The ventrals are 225 and there are 54 single subcaudals; temporals, 1 + 2 + 2. Supralabials white except on upper edges. It is difficult to discern a break in coloring between head and the first blotch, which has a length of 21 scales. Other following blotches have a length of respectively 10½, 9½, 7, 5½, 4½ scales. The total length is 878 mm.; the tail, 119 mm.; the width of head, 15; length of head, 21. The flecks on the dorsal scales are larger and more numerous, extending lower on the sides. There are no subcaudal spots, and the venter is whiter, lacking the faint amber tinge on the edges of the posterior ventrals.

Distribution: In Thailand the species has been found in the following provinces: Chon Buri (Siracha), Pattani, (Na Pradoo) and Trang (Khao Chong Forest Station). One has been reported from Nakon Ratchasima, and another from Koh Kut, an island in the Gulf of Siam. Elsewhere the species is known in Sumatra, Java, Borneo, Celebes, Malaya and Indo-China (Annam).

Remarks: The relatively small number of specimens, of this large and conspicuously marked snake in collections, suggests that it is wholly nocturnal in habit; otherwise it surely would be better known. The specimen described was one of two obtained at the same time at Khao Chong. They were performing what was presumed to be a typical combat "dance."

The place where they were discovered was at the edge of a small "waterfall" directly in front of a shelter house. Earlier in the day I had visited the spot hunting caecilians. It was an area where the solid rock floor was covered shallowly with a wet sod. This I removed from an area about 3 x 2 meters— an area which was promplty covered with water from four to twelve centimeters in depth. From the edge of this pool on one side was a rock retaining wall about two meters high, and fronting the wall a series of concrete steps. Under the wall was a hole going into the bank, a spot where I had captured certain frogs earlier in the day. At about 9:45 in the evening accompanied by Dr. Robert Elbel, and carrying a brilliantly lighted Coleman gasoline lantern, I left the shelter house, crossed the road and descended several steps down to the level of the stream, a distance of about 25 meters from the house. In the pool described above were two snakes, quickly recognized as *Bungarus candidus*. Their tails and perhaps half of their bodies were closely entwined, the anterior half to their bodies erect and being thrust, rapidly, now on one side and now on the other side of their adversaries head. Each snake seemingly went through the same motions, all the while being propelled through the water by undulatory movement of the entwined portions of their bodies, back and forth, around and across the pool. They seemingly had no intention of leaving the pool and were wholly unaware of the light or of our presence. We watched this proceeding for perhaps two minutes when it appeared they might desist as they approached the hole under the wall where escape would have been easy. Rather than run a risk of their escape, I captured them, before they had lowered their bodies. It was only after capture that I discovered that both were males.

The caretaker at the forestry house who had collected snakes for a former forester, and who had been at the Station for some years declared that he had never seen this species of snake. This gives weight to the idea of their being largely or exclusively nocturnal in habit.

Bungarus fasciatus (Schneider)

(Fig. 87)

Pseudoboa fasciata Schneider, Historiae amphibiorum naturalis et literariae, fasc. 2, 1801, pp. 283-284 (based on Russell's Indian Serpents, vol. 1, 1796, p. 3, pl. 3 (type-locality, Bengal).

Bungarus annularis Daudin, Histoire naturelle des reptiles, vol. 5, 1803, pp. 265-269 (type-locality, Mansoor-Cottah, India).

Bungarus fasciatus: Fayrer, Thanatophidia of India, 1874, p. 10, pl. 9; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 32, 33, 63; Boulenger, The fauna of British India, Ceylon, and Burma . . . Reptilia and Batrachia, 1890, p. 388; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 366-367; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 198-199; Primrose, Journ. Bombay Nat. Hist. Soc., vol. 12, 1899, p. 589; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 344; *ibid.*, vol. 19, 1909, p. 835; *ibid.*, vol. 20, 1911, p. 933 (Col. pl.); *ibid.*, vol. 30, 1924, p. 22; Poisonous snakes of India, 1928, p. 14; Evans, Journ. Bombay Nat. Hist. Soc., vol. 16, 1905, p. 519; O. Smith, *ibid.*, vol. 21, 1911, p. 283; Kinear, *ibid.*, vol. 22, 1913, p. 635; Martin, *ibid.*, vol. 22, 1913, p. 635; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1915, p. 177 (photo). Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 163; de Rooij, Reptiles of the Indo-Australian Archipelago; Ophidia, 1917, p. 243; Sworder, Singapore naturalist, no. 3, 1924, pp. 19-22; M. Smith, Bull. Raffles Mus., No. 3, 1930, p. 67; Masson, Journ. Bombay N. Hist. Soc., vol. 34, 1930, p. 256; Pope, The reptiles of China, 1935, pp. 332-334, pl. 15; Bourret, Les serpents de l'Indochine, vol. 2, 1936, p. 385; Shaw, Shebbeare, and Barker, Journ. Bengal, Nat. Hist. Soc., vol. 16, 1942, p. 116; Smith, The fauna of British India, Ceylon, and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 411-412, fig. 133 B. Tweedie, The snakes of Malaya, 1954, pp. 90-91, pl. 8, fig. 22.

Bungarus fasciatus insularis Mell, Sitz. Ges. Nat. Fr. Berlin 1930, p. 325 (type-locality, Inselindien).

Bungarus fasciatus bifasciatus Mell, Sitz. Ges. Nat. Fr. Berlin, p. 325 (type-locality, Yao-Shan, Kwangsi Prov. China).

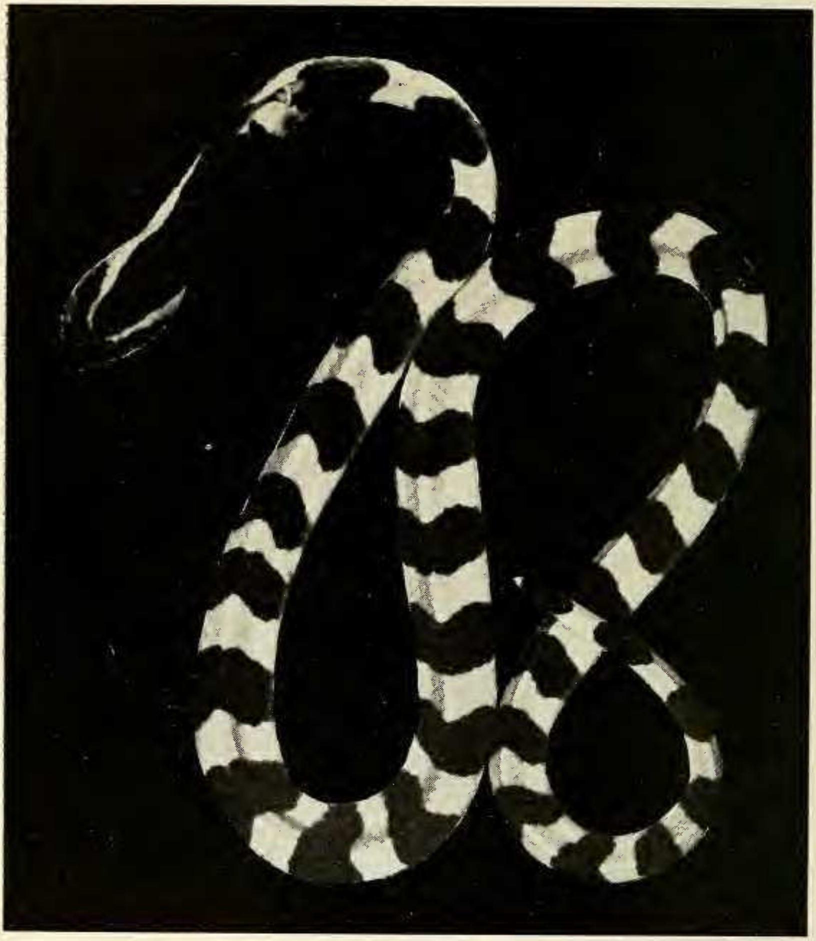

FIG. 87. *Bungarus fasciatus* (Schneider). EHT-HMS No. 22 yg. ♂, Chiang Mai, Thailand. Actual total length, 440 mm.; tail, 47 mm.

Diagnosis: A large serpent reaching a length of more than two meters. Scales in 15 rows throughout; tail blunt, more or less swollen at tip; a prominent ridge along middle of back and tail; one preocular, two postoculars. Alternately banded in black and yellow (or buff) the black bands being practically as broad as their interspaces; a large black symmetrical mark on nape extending forwards to level of eyes.

Description of species (from No. 22, Chiang Mai, Chiang Mai province, Thailand): Rostral broader than high, rather narrowly visible above; internasals about two thirds as long as prefrontals; frontal longer than wide, longer than its distance from end of snout, shorter than parietals, its width slightly less than twice width of supraoculars; parietals truncate posteriorly, followed by a pair of scales lying between posterior temporals; nasal divided, anterior part largest and highest; posterior part depressed anteriorly; no loreal; a preocular, two postoculars, upper largest; temporals, 1 + 2 + 3; seven supralabials; third and fourth border eye, sixth the largest; infralabials seven, three bordering first chinshields which are distinctly larger than second pair, both pairs in contact with each other.

Scale-formula: 21 (about occiput), 17, 15, 15; all scales smooth, median dorsals widened, other scales forming somewhat diagonal transverse rows; ventrals, 226; subcaudals, 41 (single). A ridge along the back and tail; eye length equal to its distance from front of nostril. Tail blunt at tip.

Color: Generally yellowish or buff with a series of 28 black bands that surround the body and tail, usually a little narrower ventrally where they become rather dim and may be virtually interrupted on mid-ventral line; an elongate spot begins on neck, runs forward to head, where it narrows and terminates on frontal or merges with dark color of frontal region; small whitish marks on anterior head scales; supralabials largely white or yellow, often some black color along the upper borders and on sutures; underside of neck uniform cream; chin immaculate.

Measurements in mm.: Total length, 440; tail, 47; head-length, 18.5; head-width, 11.8.

Variation: This species exhibits a minimum of variation in most of its characters. The ventral range is from 200 to 234, the subcaudal range, 23 to 39.

Distribution: The species ranges from India throughout the Indo-Chinese subregion, the Malay peninsula and Archipelago. The snake is to be found throughout Thailand, more usually in the lowlands. In Burma it has been taken at an altitude of about 2300 m.

Remarks: The species may reach a size of 2125 mm., but few attain this length.

In Thailand it is called *Ngu sam lien* because of the sharp ridge on the back which give a triangular cross-section to the body.

Hatchlings measure 320-340 mm. in length. Dr. Malcolm Smith states that there is no authentic record of human beings having been bitten by this snake! He records a specimen from the city of Bangkok measuring 2020 m., the tail 150 mm. An Indian specimen has been reported with a length of 7 feet.

Genus *Naja* Laurenti

Naja Laurenti, Specimen medicum, exhibens synopsin reptilium emendatum, 1768, p. 90 (type of genus *Coluber naja* Linnaeus).

Diagnosis: Maxillary extending beyond palatine with large grooved poison-fangs; none or one small faintly grooved tooth following; anterior mandibular teeth longest; head not distinct from neck; no loreal scale; pupil round; nostril between two nasals with internasal and first labial touching or almost touching it. Body cylindrical; scales smooth, lacking apical pits, in diagonal transverse rows; subcaudals divided; no much-enlarged postparietal scales; elongate nuchal ribs capable of expanding the anterior part of the neck into a "hood."

The genus presents distinct taxonomic problems and there is considerable diversity of opinion as to the status of the various *kinds* of cobras in southeastern Asia. Are they species, subspecies, or "color varieties"? Boulenger (1896) lists some six "var." which may possibly be interpreted as subspecies of his *Naia tripudians.* Wall who studied Indian forms likewise recognized a number of forms in India and southeastern Asia. Pope (1935) recognized only a single subspecies in China; and Bourret (1936) recognized two in Indo-China. Recently (1960) Deraniyagala has presented a new repartition of the Asiatic species, a paper I have not seen.

Malcolm Smith (1943) recognized the presence of one subspecies occurring in Thailand, a form usually bearing a monocellate spot on the upper surface of the neck. This presumably represents the typical *N. naja kaouthia.* He describes the young as being olivaceus, brownish to black above, with or without a yellow or orange colored, O-shaped, or monocellate, mark upon the hood. He further mentions a report of bright green or blue cobras in Burma and at Nan, north Thailand; and mentions a green specimen from Den Chai, Lampang.

Since the variation from the typical coloration of *Naja naja kaouthia* is so great, the recognition of the variations as true cobras is very difficult for the layman. To facilitate such recognition I offer brief descriptions of the various kinds. I am not wholly convinced that they should not be considered subspecies or perhaps in some cases even species. My personal experience with these "varieties" is such that I cannot decide, and I leave them without individual names.

Naja naja kaouthia Lesson *in* Férussac

(Fig. 88)

Naja kaouthia Lesson *in* Férussac, Bull. Sci. Nat. 1831, vol. 25, 1831, p. 122; and Belanger, Voy. Orient. Rept. Sept. 1832, p. 312, pl. 2 (type-locality, Bengal).

Naja naja kaouthia, M. Smith, Rec. Ind., vol. 42, 1940, p. 485; The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Dec. 1943, pp. 428, 531-535, fig. 138, i. j.

Naja fasciata Wall, Journ. Bombay Nat. Hist. Soc., vol. 22, p. 246 (var.) includes (*kaouthia* Lesson, *larvata* Cantor *scopinucha* Cope).

Diagnosis: Hood with a single "monocle" or O-shaped cream mark; 28 to 26 scalerows on neck, 21 on middle of body. Two small black spots on sides of throat with one to three dark bars on neck and anterior part of body; remainder of venter usually dark; subcaudal region light or cream; transverse scalerows chevron-shaped, made distinct by slightly darker edges on scales, and lighter color between scales.

Description of subspecies (from No. 2413, Kanchanaburi typical form): Rostral one and one third times as wide as high, narrowly visible above; internasals large, in contract laterally with nasals and preocular; prefrontals narrower but about as long as internasals; frontal small, much shorter than supraoculars, but of same width very much shorter than its distance from rostral, much shorter than parietals; a single small postoccipital scale between upper secondary temporals. Nasal divided, posterior part higher but shorter than anterior part; no loreal; a preocular (on right side a second small subocular below the normal preocular); three postoculars; two large anterior temporals followed by four irregular secondary temporals; seven supralabials, third and fourth bordering orbit, last labial elongate. Mental much smaller than rostral, its labial border little more than half as long as that of rostral; first chinshields slightly wider but scarcely as long as second pair; eight infralabials, four bordering first chinshields; a small cuneate scale on labial border between fourth and fifth infralabial; eye small, its diameter a little more than half its distance from oral border.

Scale-formula: 29, 21, 15(13); ventrals, ♂ 174; subcaudals, 57; anal, single.

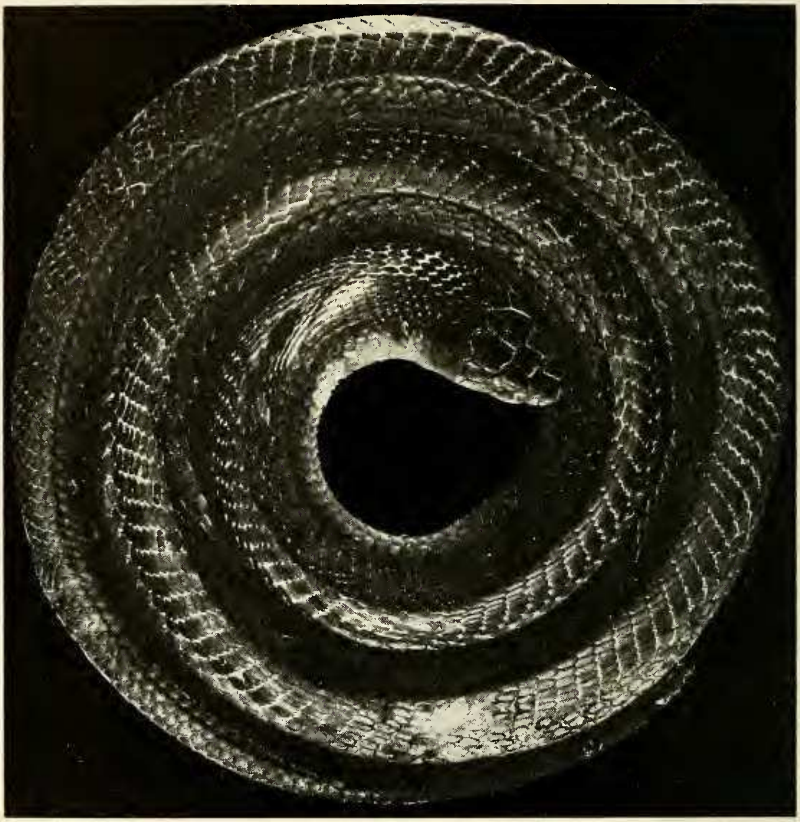

FIG. 88. *Naja naja kaouthia* Lesson *in* Férussac. No. 34822, Phatthalung, Phatthalung province. Actual total length, 1430 mm.; tail, 257 mm.

Color: Dark brown above, of a slightly lighter shade anteriorly; posterior edges of scales a trifle darker; top of head nearly uniformly dark growing lighter on side of head with whitish areas on last three supralabials; an O-shaped lighter spot with a dark center and a narrow black border on "hood"; skin between scales dark with numerous dashlike white marks concealed (unless scales are separated). Chin and throat ivory with a black spot on ends of the sixth to ninth ventrals; after an interval of three ivory-colored ventrals, a black bar covering seven ventrals; five ivory scales follow, then a cloudy area covering ten ventrals; after one or two ivory scales the remainder of the venter is dark gray-brown, at least anteriorly, the pigment appearing as discrete flecks; subcaudal area light ivory with brownish flecks on scale edges.

Variation: In Thailand specimens the range of variation in this form is not great. Some specimens tend to become a little lighter in old age and the monocular mark on the hood may be less distinct. There may be as many as four black bars on the venter separated by narrower lighter areas. Occasional specimens showing a little more light color between the scales, appear to be marked anteriorly with dim narrow light dorsal bands at intervals.

Distribution: This form is known from Bengal, Burma and Thailand, especially in the large rice-growing areas. Specimens are known from Narathiwat, Pattani, Nonthaburi, Ayutthaya, Kanchanaburi and Bangkok, and presumably occurs throughout the country.

Remarks: The cobra di capello (Portuguese name) is one of the most widely known serpents. In its abbreviated form 'cobra' the name is widely known as the name "*Boa constrictor,*" or "rattlesnake," although the name 'cobra' is applicable, in the Portuguese, to most kinds of snakes.

The snake is rather timid and stories of its aggressiveness are usually exaggerated. In the rice fields it has become semiaquatic. Here it finds frogs in abundance and certain rodents that burrow into the low walls of the rice paddies. These animals represent the major food of the cobra.

Almost all herpetologists who have had occasion to deal taxonomically with the cobras of India and southeastern Asia have found difficulty. As remarked, there are several 'forms' which may be species, subspecies or color varieties. If regarded as subspecies we may have the phenomenon of three subspecies occurring in a single locality.

It is known that the cobra is carried about by snake charmers, and one explanation might be that escaped specimens from distant localities might cross with a local population and produce individuals difficult to classify. However it is the fact that some of the kinds are separated by scale differences which tend to be fairly constant, as well as by specific pattern differences.

In Thailand there are several known forms that are easily recognized, and perhaps others that may or may not fit into this grouping. Malcolm Smith has reported a green or olive-green cobra from Den Chai, south of Lampang, Thailand, "The greenness was pronounced." Wall (1913) also reports the presence of green (or blue) cobras in the Khasi Hills in Burma and at Nan in north "Siam." Wall has proposed the name *viridis* for these.

SYNOPSIS OF THE THAI "VARIETIES" OF *Naja n. kaouthia*

1. Venter uniform yellowish white with small black spots on throat the light color tending to encroach on sides of neck; above, body fawn, scales edged with lavender-brown; four to ten light fawn bands edged with black-brown across body, no nuchal mark on hood. Ventrals, 180-182; subcaudals, 50-52; totals, 230-234; scalerows on neck, 25, mid-body, 19, preceding vent, 14 (15). One cuneate scale on lower lip; three postparietals; rostral barely visible above. (See Figure 89)........................ *Variety A*

   Without marks on throat; no bands on posterior part of body; with or without a nuchal mark.................................... 2

2. Venter light yellow-ivory to gray-ivory; posterior ventral scales edged with light gray; above nearly uniform grayish fawn with two elongate gray-black nuchal marks separated by a fawn area extending back to level of 19th ventral; no bands of black or white on throat. Ventrals, 172; subcaudals, 57; total, 229; scalerows on neck, 31; mid-body, 21, preceding vent, 15; two small cuneate scales on lower lip excluding (or not) the fifth labial from mouth border; (See fig. 90)...................... *Variety B*

   Venter not light; usually two black and two white bands following cream-white area on chin and throat. A nuchal mark present or absent, if present, variable.................................... 3

3. Almost uniform brownish black on head, body, and tail. No nuchal mark; two black and two white transverse bands on throat (trace of a third light band), venter otherwise black; some cream flecks on subcaudal area; ventrals, 164; subcaudals, 50; total, 214. Scalerows: 29, 19, 13; one cuneate on lower lip between fourth and fifth infralabials; one median postparietal scale; second chinshields in contact. (Detailed description given), *Variety C*

   A nuchal, "monocellate type" mark present; venter variable........... 4

4. A quadrangular or diamond-shaped cream nuchal spot, bordered by black, surrounding a large deep-black oval spot; a small oval black spot on each side of the large mark. Body above brownish, black on head; anterior half of body dove-gray; latter half of body darkening first to brownish, then to purplish brown, and to black; small black spots on throat; two dark blackish gray bands separated by cream bands on throat; remainder of venter blackish; subcaudal scales cream, edged with black. Ventrals, 170; subcaudals, 57. Scalerows: 32, 21, 15; one cuneate scale present; rostral scarcely visible above. (Detailed description)......... *Variety D*

   Nuchal mark not quadrangular.................................... 5

5. Above dark blackish brown; an elongate oval light brown area outlined in black and enclosing a black oval mark on nuchal region (hood); on underside of neck two black and two cream bands, the second of these continuous with the cream of the venter. This cream color becomes yellowish gray posteriorly and the venter has two lateral bands of gray-olive on sides of ventral scales, throughout rest of body. Ventrals, 177; subcaudals, 58; scalerows: 31, 23, 15; three cuneate scales excluding fifth supralabial from labial border; 3 postparietals. Frontal nearly quadrangular, short; rostral strongly visible above; lower primary and lower secondary temporals very large.................................Typical *kaouthia*

   (This is the typical form with a distinct monocellate hood mark, see description and figure 88.)
   Venter not so marked.................................... 6

6. Not green; generally blackish above with head olive brown; light on sides; a narrow ring of yellow-cream surrounding a black oval spot in nuchal region. When epidermis is removed scales show somewhat lighter centers. Chin and throat pure cream, color encroaching on first scalerow and with small black spots on each side; sides of nuchal region (hood) blacker than remainder of dorsum. Ventrals, 174; subcaudals, 57; total, 231 (Na Pradoo, Pattani). Ventrals, 161; subcaudals, 49; total, 210 (Bang Saen, Chon Buri); three postparietals; two lower temporals largest. (This is possibly a juvenile of the typical form)...................... *Variety E*

Dorsal color green. Another variety mentioned by Wall (1913) and Malcolm Smith (1943) is a green cobra occurring in northern Thailand. Smith has seen one from Den Chai, south of Lampang; Wall has reported the species as occurring at Nan, northern Thailand. The color described as "bright green or blue" .... *Variety F*

Naja naja kaouthia (Variety A)

(Fig. 89)

Description (from C.U. No. 2619, Na Pradoo, Pattani, southern Thailand): Rostral about one-and-one-fourth times wider than high, narrowly but plainly visible above; internasals a little smaller then prefrontals, touching preocular; prefrontals wider anteriorly than posteriorly, their common suture double that between internasals; frontal moderate, its length equal to its distance from tip to snout, about as long as parietal suture, but shorter than parietal; three postparietals between posterior upper temporals; nostril between two nasals, bordered above by an internasal and below by first supralabial; preocular not reaching upper surface of head; three postoculars; two large anterior temporals, followed by an irregular group of small temporal scales; supraoculars in the following ascending order of size: 2, 1, 3, 6, 5, 2, 7 but the last five not very different in size. Infralabials eight, four bordering anterior chinshields; a small cuneate scale on lower labial border between fourth and fifth infralabials (on one side excluding the fifth infralabial from labial border); second chinshields smaller than first, and separated by one or two scales.

Scalerow-formula: 22 occiput, 25 about neck, 19 at middle of body; 15 (14) before vent. Ventrals, 182; subcaudals, 52; nine bands on body, three on tail.

Color: Top of head brownish (grayish when epidermis is shed); sides of head brownish ivory. Above generally light brown, scales partly edged with fawn; a series of nine light bands crossing body their edges darker brown, anteriorly less than width of one transverse scalerow, posteriorly the width of two scalerows. The bands are rather equally spaced except that none are present on anterior fifth of body; entire chin and venter white, except that outer edges of ventrals have a narrow edging of pigment; a median black spot on fifth to eighth ventral with two lateral spots on the tenth and eleventh.

Measurements in mm. (Nos. 2619 and 2618 respectively): Total length, 568, 477; tail, 85, 68; width of head, 15.2, 15; length of head, 23, 19.

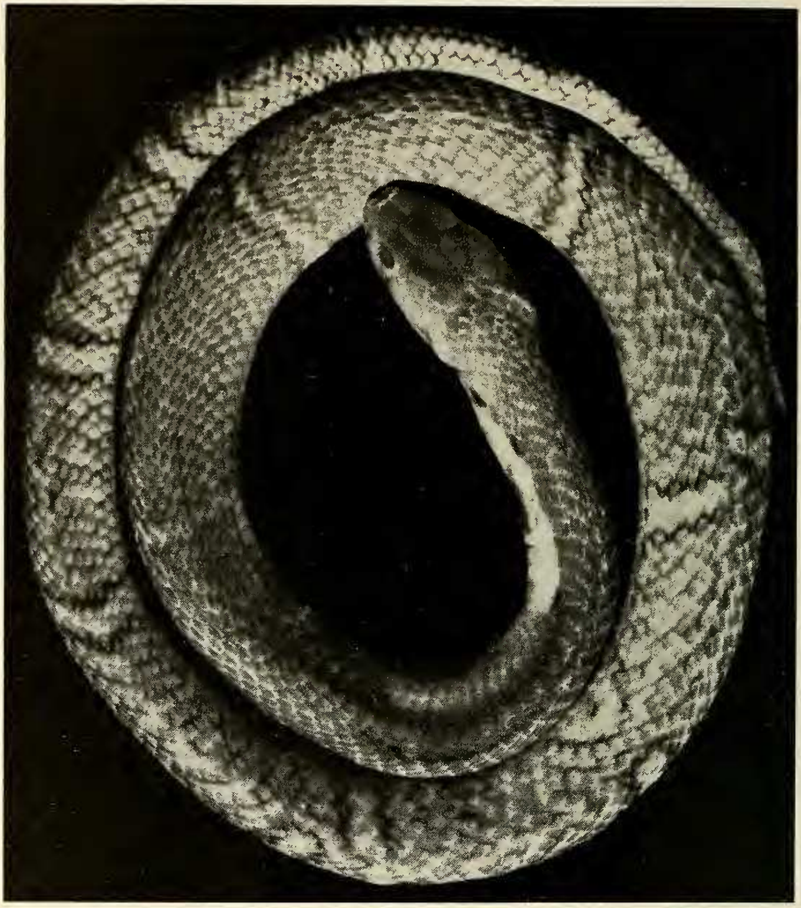

FIG. 89. *Naja naja kaouthia* Lesson *in* Férussac. Variety. C.U. No. 2619, Na Pradoo, Pattani, province southern Thailand. Actual total length, 568 mm.; tail, 85 mm. (Variety A.)

Remarks: The second specimen shows only five lighter bands on the latter half of the body and the median black spot on the throat is absent. The squamation on the heads is identical. The scale-formula is the same. Ventrals, 180; subcaudals, 50; anal single.

The monocellate form occurs in the same area.

Naja naja kaouthia (Variety B)

(Fig. 90)

Descripion of Variety B (from No. 33545, ♂ locality uncertain): Rostral nearly twice as wide as high, barely visible above; internasals as large in area as prefrontals, touching preocular; frontal

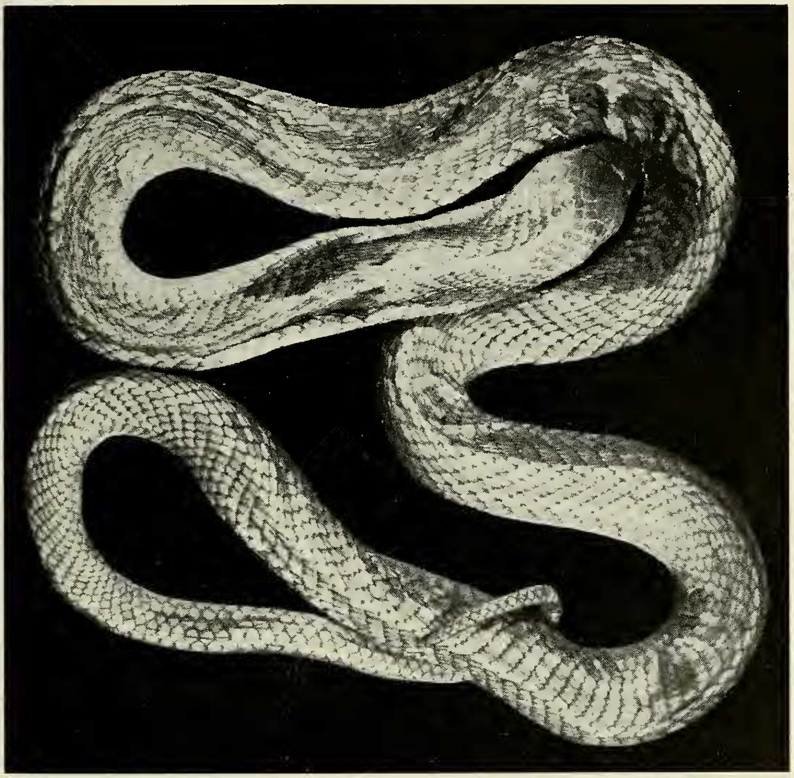

FIG. 90. *Naja naja kaouthia* Lesson *in* Férussac. No. 33545, Thailand. Actual total length, 1215 mm.; tail, 210 mm. (Variety B.)

almost quadrangular, wider and shorter than supraoculars, equal to its distance from internasals, about half as long as parietals; nostril between two nasals, anterior the larger; nostril bordered above by internasal, below by first supralabial; seven supralabials in following ascending order of size: 2, 1, 4, 6, 3, 5, 7, third and fourth enter eye. Two large anterior temporals followed by three, the lower one of which is about as large as the two anterior; eight infralabials, four bordering first chinshields; mental about one half width of rostral; between fourth and fifth, and fifth and sixth are two tiny cuneate scales bordering lip, excluding or almost excluding fifth supralabial from oral border.

Scalerow-formula: 24 occiput, 31 neck, 21 mid-body, 15 before vent. Ventrals, 172; subcaudals, 57; anal, single.

Color in life: Body a nearly uniform yellowish olive, the edges of most of the scales grayish with the skin dark between scales.

Beginning behind occiput on each side, a dark gray area covering nine scalerows, but narrowing to three rows at level of eleventh ventral, then again widening to cover ten rows, then narrowing to one row and terminating at level of the 19th ventral. Middorsally the light-brown color is narrowed to three scalerows then widens to eleven scalerows and again narrows to four rows, again widening and merging into dorsal coloration of remainder or dorsum. Chin, neck, and venter anteriorly yellowish ivory, later developing to a dirty brownish white. Latter half of body has ventrals dimly edged with gray. Subcaudal area ivory-white. Top of head nearly uniform olive-brown.

Measurements in mm.: Total length, 1215; tail, 210; width of head, 30; length of head, 42.

Naja naja kaouthia (Variety C)

Description of Variety C (from No. 34246, Bang Saen, Chon Buri, southeastern Thailand): Rostral at least one-third wider than high, well visible above; internasals large, wide laterally, touching the preocular; prefrontals of about same area as internasals, in contact laterally with preocular; frontal moderately small, equal to its distance from rostral, only a little larger than prefrontals, shorter but slightly wider than supraoculars, much shorter than the parietals. Latter scales longer than wide; one somewhat enlarged median postparietal scale; nasal completely divided, anterior part largest; nostril practically as large as anterior portion of nasal, bordered below by first supralabial; a single preocular widely separated from frontal; three postoculars; two anterior temporals; seven supralabials in following ascending order of size: 2, 1, 3, 4, 5, 6, 7; mental small; eight infralabials, first four bordering first chinshields which are a little wider than second pair. A small intercalated cuneate scale on labial border between the fourth and fifth infralabials.

Scale-formula: 25 (occiput), 27, 19, 13, scales without pits, but arranged in oblique transverse rows, the median longitudinal rows smallest; scales on posterior part of body larger, the three outer rows larger than others. Ventrals, 164; subcaudals, 50, paired; anal, single.

Color in life: Brownish black to black on head, body, and tail; chin brownish white with a pair of yellow spots; first 14 ventrals gray-olive; next eight ventrals blackish followed by three olive ventrals with two small yellow spots. At intervals occasional small yellow spots on brownish-mottled, dark-olive venter. Sides of head brownish olive; subcaudal area somewhat brownish gray with some yellowish color between paired subcaudals.

Measurements in mm.: Total length, 1214; tail, 175; length of head, 56; width of head, 34.

Remarks: The specimen was captured alive on the campus of the Teachers College at Bang Saen, Chon Buri province.

At Bangkok while making moving pictures of the animal crawling on the ground, it discharged its venom towards me as evidenced by a spray of amber droplets of the venom on my eye-glasses.

Naja naja kaouthia (Variety D)

Description of Variety D (from C.U. 2686): Rostral ½ wider than high, scarcely visible above; internasals large, about equal in size to prefrontals, but prefrontal suture longer than internasal suture; frontal small, its length much less than its distance from tip of snout (8 mm. x 12.5 mm.), a little wider but shorter than supraoculars; parietals rather narrow, elongate (15 mm.); nasal divided; no loreal; a preocular and three postoculars; temporal 2 + 3, first temporals large; supralabials in following ascending order of size: 2, 1, 4, 5, 6, 3, 7; eye diameter slightly less than distance of eye from lip; infralabials seven, four touching first pair of chinshields.

Scalerow-formula: 32, 21, 15; scales longer than wide, arranged in diagonal transverse rows. Ventrals, 170; anal, single; subcaudals, 57, paired.

Color: Head above brownish or grayish olive-brown; sides of head, light horn color; a white quadrangular or diamond-shaped dark-edged spot surrounding a large oval black spot, with a small oval black spot on each side, the surrounding skin blackish, the scales grayish. Dorsally anterior half of body dove-gray, skin between scales blackish; in latter half of body scales darkening; brownish or purplish brown to blackish laterally.

Chin and throat pure white with a black spot on each end of seventh and eighth ventral scales; 12th to 18th ventrals lightly clouded gray-brown, followed by four white ventrals; next eleven ventrals grayish with the following three ventrals light. Beyond these venter gradually growing darker, becoming black then gradually attaining a transverse grayish streak. Anal region light; subcaudals light cream, strongly edged with black or brownish black.

Measurements in mm.: Total length, 1305; tail, 222; width of head, 28; length of head, 41.

Remarks: This specimen is in the collection at Chulalongkorn University. It is a Thai specimen from a locality unknown to me. The sharply angulate nuchal mark has not been recorded for Thailand specimens.

Genus *Dendraspis* Fitzinger

Dendraspis Fitzinger, Systema reptilium, 1843, p. 28 (type of genus, *bungarus* = *hannah*).

Since the name *Hamadryas* of Cantor, 1836, is preoccupied by *Hamadryas* Hubner, 1806, it would appear that Fitzinger's name *Dendraspis,* 1843, is the next name available. The genus is presumably monotypic.

Diagnosis: Large poisonous snakes reaching a length of five, to five and one-half meters. Scales in 15 rows at mid-body; anterior subcaudals single; poison-fangs followed by three teeth; a pair of large occipital scales with occasionally an interoccipital. No small (cuneate) scale on lower jaw between labials; neck slightly dilatable; young with deep black and yellow bands.

By the characters listed this snake is amply differentiated generically from the genus *Naja.* It is a wide-spread species that shows a minimum of variation save that pertaining to age. Because of its great size (the largest poisonous snake), and its name (King Cobra), it has been the subject of much popular literature. Much that has been written while largely true, tends to exaggerate its dangerous qualities. There is at least one account in scientific literature, where the snake is presumed to have made an attack without provocation. But at the same time there is given evidence that the snake does not attack unprovoked. More frequently it attempts to escape from the presence of man under ordinary circumstances.

The species has a well-known habit of nest building. A pile of leaves and twigs serve for the nest, the material often being accumulated by the technique of shoving the materials together with the body. The eggs are deposited on the lower layers of this material, and covered. One of the pair usually occupies the upper part of the piled material, guarding the eggs. A favorite place for this nest building is in clumps of bamboo that normally accumulate leaves between the stems.

The King Cobra is ophiophagus and thus requires a considerable territory for food finding. In consequence the snake is rarely regarded as common in any locality. In places where reports claim the snake is common, one usually finds that the common rat snakes of the genus *Ptyas* are mistaken for the King Cobra.

While collecting under police escort near Bhetong, Yala, the captain of police who also had accompanied me repeatedly warned me of the King Cobra. I suggested that rat snakes were often mistaken for the cobra, but he assured me that he could distinguish the cobra. Later in the day he spotted a large snake, with a length of approximately eight feet, its head reared, at the edge of thick jungle. "Cobra," he said, "Now let me see you capture it."

The chance of getting the snake was small. I crossed a tiny rivulet and approached the snake with extreme slowness until I stood within reach of it and with a sudden thrust grabbed it by the head and neck. Despite all my protestations that the snake was a rat snake it remained a King Cobra as far as he was concerned. The story was still extant two years later, of my capture by this method of a King Cobra. It makes a better story so.

Dendraspis hannah (Cantor)

Hamadryas hannah Cantor, Asiatic research, vol. 19, 1836, p. 187, pls. 10-12 (type-locality, Sandarbans, near Calcutta, India).

Naja hannah: Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 189, pl. (monographic treatment); *ibid.*, vol. 30, 1925, pp. 242, 820; *ibid.*, vol. 21, 1926, p. 564, fig.; The poisonous snakes of India, 1928, p. 27; Aagaard, Journ. Nat. Hist. Soc. Siam, vol. 6, 1924, p. 315; Pope, The reptiles of China, 1935, pp. 346-348, pl. 16, A, B; Bourret, Les serpents de l'Indochine, 1936, p. 299; M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 485; The fauna of British India, including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 436-439; Tweedie, The snakes of Malaya, 1954, pp. 98-100, fig. 23, b, c.

Naja bungarus Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 476, pl. 17, figs. 8, 9 (type-locality, Sumatra); Schlegel, and Müller, Verh. Overz. Bes Nederland Indië, Rept., 1844, p. 71, pl. 10; Peters, Mon. Berl. Acad., 1861, p. 690; Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, pp. 392-393; Sclater, List of the snakes in the India Museum, 1891, p. 59; Wasey, Journ. Bombay Nat. Hist. Soc., vol. 7, 1892; p. 257; Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 386; Flower, Proc. Zool. Soc. London, 1899, p. 691; Bannerman, Journ. Bombay Nat. Hist. Soc., vol. 15, 1904, p. 407; Annandale, Journ. Asiat. Soc. Bengal, 1905, p. 176; Wall, Journ. Bombay Nat. Hist. Soc., vol. 17, 1906, p. 303; *ibid.*, vol. 18, 1908, p. 331; The poisonous terrestrial snakes of our British Indian Dominions . . . 1907, p. 26; 1908, p. 33; Mocquard, Les reptiles l'Indo-chine, 1907, p. 53; Sarasin, Zool. Jahr. Jena, 1910, p. 144; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 202-203, fig. 60, (*Naia*); Acton and Knowles, Journ. Ind. Med. Res., 1914, p. 52; Prashad, Journ. Bombay Nat. Hist. Soc., vol. 23, 1915, p. 585; Fenton, *ibid.*, vol. 25, 1917, p. 151; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 249, figs. 93, 94.

Hamadryas ophiophagus Cantor, Proc. Zool. Soc. London, 1839, p. 32 (type-locality, Bengal); Journ. Asiat. Soc., Bengal, vol. 16, pt. 2, 1847, p. 116.

Trimeresurus ophiophagus: Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, pp. 1245-1247.

Hamadryas elaps: Günther, Catalogue of the Colubrine snakes in the British Museum, 1859, p. 219; Theobald, Journ. Linn. Soc. Zool., vol. 10, no. 41, May 30, 1868, pp. 60-61.

Ophiophagus elaps: Günther, Reptiles of British India, 1864, p. 341; Stoliczka, Journ. Asiat. Soc. Bengal, vol. 39, 1870, p. 210; Anderson, Proc. Zool. Soc. London, 1871, p. 188; Fayrer, Thanatophidia of India, 1874, pls. 7, 8; Phipson, Journ. Bombay Nat. Hist. Soc., vol. 2, 1887, p. 245; Boettger, Ber. Offenb. Ver. Nat., 1888, p. 86.

Naja fasciata Peters, Monats. Akad. Wiss. Berlin, 1861, p. 689.

Naja vittata Elliot, Madras Journ. Litt. and Sci., vol. 11, 1840, p. 39, pl. 1 (type-locality, at sea, near Madras).

Trimeresurus bungarus: Jan, Rev. Mag. Zool., 1859, p. 129; Jan and Sordelli, Iconographie générale, livr. 44, 1873, pl. 4 (Singapore, Siam).

Hamadryas elaps: Theobald, Descriptive Catalogue of the reptiles of British India, 1876, p. 209.

Naja ingens Van Hasselt, Versl. A.K. Amsterdam, vol. 17, 1882, p. 140 (not seen).

Naja tripudians sumatrana Müller, Verh. Nat. Ges. Basel, vol. 8, 1887, p. 277 (Sumatra).

Diagnosis: See generic diagnosis.

Description of species (from No. 1653 ♀, Khao Kampan): Rostral one and one-half times as wide as high, part visible above triangular; internasals wider than long, touching nasals laterally; prefrontals wider than long, wedged between preocular and second nasal; frontal short, nearly truncate anteriorly, shorter than its distance from rostral, much shorter than parietals, scarcely as wide as supraoculars; parietals longer than wide, a pair of large occipitals, forming a median suture; nasal divided; preocular moderate, separated from internasals, not reaching upper surface of head; three postoculars, two touching upper anterior temporal, two touching lower anterior; temporals, 2 + 2; seven supralabials, first in contact with both nasals; third and fourth bordering orbit. Mental small, convex behind; eight infralabials, four touching first chinshields which are wider but shorter than second pair.

Scale-formula: 19 on occiput; 21 on neck, 15 at mid-body; 15 before vent; three median scalerows somewhat enlarged on much of the body. Ventrals, 266; anal, single; subcaudals, 106, five single and 101 divided except terminal.

Color in life: Above generally olive; black-edged scales on back of head. Towards posterior part of body and on tail, lighter scales gradually becoming darker on the edges. On tail, scales yellowish ivory with well-defined black edges. Chin and throat yellowish and ivory with some grayish-olive areas; remainder of ventrals gray with some ivory flecks growing lighter toward vent; subcaudals dull ivory each scale black-edged.

Measurements in mm.: Total length, 2690; snout to vent, 2123; tail, 567; width of head, 44; length of head, 54.

Variation: The number of ventrals and subcaudals vary between 240 and 266; 84 and 106. The usual number of scalerows on the neck is 17 or 19. A small interoccipital scale may be present. The coloration of young specimens is deep black with transverse narrow yellow bands. Four of the bands cross the head.

Distribution: In Thailand the snake has been taken in Chiang Mai, Yala and Narathiwat provinces but is known to occur widely in the country.

Outside of Thailand the species ranges from Peninsular India to the Himalayas (not in Ceylon), Burma, Indo-China, Southern China, Malaya, and the Indo-Australian Archipelago as far east as Luzon in the Philippines. It appears to reach its maximum size in the Malay peninsula.

Remarks: The transverse marks of the very young are often retained in the adult as visible lighter marks, the lighter color being largely on the skin between the scales.

The species is oviparous, the number of eggs reported vary between 21 and 40. The young, just hatched, measure from 500 to 530 millimeters in length.

The described specimen was captured in a cave in Khao Kampan, Pattani.

Genus *Maticora* Gray

Maticora Gray, Illustrations of Indian Zoology, 1834, pl. 86, fig. 2 (type, *lineata*).

Doliophis Girard, Proc. Acad. Nat. Sci. Philadelphia, 1852, p. 182; U. S. Exploring Expedition., Herpetology, 1858, p. 175 (type of genus *flaviceps*).

Diagnosis: Very small to large snakes. No loreal; scales smooth without pits in 13 rows; head sometimes red, relatively small, not separated from neck; eye small with round pupil; tail short, often red, the subcaudals paired; anal divided; maxillary extending beyond palatine, bearing a pair of large grooved fangs; prefrontal bones in contact; poison-glands extending into body cavity, increasing in diameter posteriorly.

This genus is represented in Thailand by two species, *Maticora bivirgata*, and *M. intestinalis*. Dr. L. D. Brongersma has revised the forms under *bivirgata*, recognizing three forms identified as subspecies. The typical form *b. bivirgata* occurs in Java; *b. tetrataenia* in Borneo and very doubtfully also in Java and Sumatra; *b. flaviceps* is a subspecies occurring in Sumatra and nearby islands, and in the Malay Peninsula.

Loveridge in (1944) lists in his key eight subspecies of *intestinalis* and one full species, but is not certain but that some listed as subspecies may actually be species.

A paper published by A. M. R. Wegner in 1954 discusses the geographic ranges of the so-called subspecies of *intestinalis.* I have not seen this.

KEY TO THAI SPECIES OF MATICORA

1. Venter red, immaculate; head and tail red; no dorsal spots (normally); ventral range, males, 260 to 277; females, 230 to 246. . .*bivirgata flaviceps*
2. Venter barred with black and red (or ivory-cream, or pink). A median yellow or yellow-brown dorsal line flanked by two black lines; venter with about 40 black bars; no dorsal spotting; ventrals, 213 to 266; in Thai specimens, 237 to 240. . . . .*intestinalis intestinalis*

Maticora bivirgata (H. Boie *in* F. Boie)

Maticora bivirgata flaviceps (Cantor)

Elaps bivirgatus H. Boie (*in* F. Boie), Isis, 1827, p. 556, (type-locality, by inference, Java); Brongersma, Zool. Meded. Uitg. Rijksm. Nat. Hist. Leiden, vol. 30, no. 1, Oct. 28, 1948, pp. 1-29.

Callophis bivirgatus: Günther, Reptiles of British India, 1864, p. 348.

Doliophis bivirgatus: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 400-401; Flower, Proc. Zool. Soc. London, 1896, p. 895; *ibid.*, 1899, p. 692; Boulenger, A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore, including the adjacent islands; Reptilia and Batrachia, 1912, pp. 205-206, fig. 61; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 251-252, fig. 95 (*part.*); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, May, 1923, p. 60.

Maticora bivirgata: Sworder, Singapore Nat., no. 2, 1922, p. 72; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 68; Tweedie, Snakes of Malaya, 1954, pp. 94-95.

Elaps flaviceps Cantor, Proc. Zool. Soc. London 1839, p. 33 (type-locality "Malacca," Malaya); Barbour, Proc. New England Zool. Club, vol. 5, 1914, p. 92 (placed as a synonym of *bivirgatus*).

Doliophis flaviceps: Girard, Proc. Acad. Nat. Sci. Philadelphia, 1857, p. 182.

Adeniophis flaviceps: Meyer, Sitzb. Akad. Wiss. Berlin, 1886, pp. 612, 614.

Calliophis flaviceps: Modigliani, Ann. Mus. Civ. Stor. Nat. Genova, ser. 2, vol. 27, 1889, p. 123.

Doliophis bivirgatus flaviceps: Boettger, Katalog der Reptilian-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft, pt. 2, Schlangen, 1898, p. 123 (*part.*).

Maticora bivirgata flaviceps: Brongersma, Zool. Meded., vol. 30, no. 1, Oct. 28, 1948, pp. 15-21 (literature list).

Diagnosis: Anterior poison-fangs present; scales smooth, in 13 rows, lacking pits; tail rather short; subcaudals double (rarely a few may be single); head, venter and subcaudal regions coral-red except on outer edges of scales which are blue-black; poison-gland extending into body cavity.

Description of species (from No. 34344, Bhetong, Yala province): Rostral visible above as a broad triangle, the scale much broader than high; internasals small, wider than long, narrowed to a point laterally; prefrontals about as wide as long, in contact laterally with posterior nasal and large preocular; frontal hexagonal, a little longer than wide, its length equal to its distance from end of snout, shorter than parietals; nostril large, situated between two nasals; no loreal; preocular large, touching third labial; two small postoculars, lower narrow, elongate; temporals, 1+2, anterior very large; six supralabials, last largest, third and fourth entering orbit; six infralabials; first chinshields a little larger than second pair, touching four labials. Eye diameter a little less than distance of eye from edge of lip.

Scale-formula: 17 (occiput), 13, 13, 13; ventrals, 294; subcaudals, 52; anal, single.

Color in life: Head coral-red, color extending back on sides of neck behind mouth-angle; chin lighter; some bluish-black color narrowly surrounds eye; body blackish blue above, each scale somewhat lighter at edges; skin between scales grayish; a narrow grayish ultramarine line on edges of two outer scalerows extending entire length of body from level of sixth ventral. A narrow dark line reaches between parietals to frontal; median part of dorsal surface of tail with a dark blue stripe; subcaudal region coral-red; venter red except outer edges of ventrals which are bluish black; scales more or less iridescent.

Measurements in mm. (Nos. 34344 ♂ and 34345 ♀): Snout to vent, 1195, 619; tail, 144, 76; total length, 1339, 695; width of head, 14, 10; length of head, 19, 15; width of body (greatest), 15, 10.2.

Variation: Specimens of *flaviceps* from Sumatra have a ventral-subcaudal count usually distinctly less than those from the Malay peninsula. Available counts for males for Malaya show the ventral-subcaudal counts vary between 326 and 346.

The sex-difference for a male and female taken at Bhetong, Yala, Thailand, is striking. The male has a total ventral-subcaudal count of 346, the female a count of 298—a difference of 48 scales! Color variation in Thai specimens is almost negligible.

Distribution: This snake is to be found in southern Thailand but records are wanting for localities elsewhere in the country. It has been taken at "Jalor," Pattani; Yala; Narathiwat, Narathiwat (Bangnara); and Singgora (=Songkhla).

The species is known also in Burma, and in Malaya. It is said to be common in certain hill districts in Malaya. A record for Cochin China has been questioned.

Remarks: Little is known regarding the habits of this brilliantly colored species, presumed to be deadly poisonous, but reputed to be unaggressive and rarely attempting to bite. It is known to feed on other snakes. It reaches a known length of 1810 millimeters.

While collecting on Fraser's Hill in Malaya I unexpectedly came upon one under a rock, where I had chased a *Mabuya.* As I lifted the rock the snake suddenly emerged, its teeth becoming caught in my sleeve at the wrist, from where it writhed and twisted as I tried to shake it loose.

The native Malay name in southern Thailand is *Ular sina matahari* (the sun-ray snake). The Thai equivalent of this name is usually applied in northern Thailand to the species, *Xenopeltis unicolor*, which has a high iridescence.

This snake is feared in southern Thailand and Malaya. It is reputed to burn a trail through the grass and other vegetation as it crawls about. Its bright red head and venter are probably responsible for such a belief.

Maticora intestinalis (Laurenti)

Aspis intestinalis Laurenti, Specimen medicum exhibens synopsin reptilium emendatum, 1768, p. 106, (type-locality, based on Seba, vol. 2, fig. 7).

Elaps furcatus Schneider, Historiae amphibiorum naturalis et literariae; fasc. secundus, 1801, pp. 303-304, (type-locality not given; perhaps based on Seba, vol. 2, pl. 2, fig. 7).

Maticora lineata Gray, Illustrations of Indian zoology, vol. 2, 1834, pl. 76, fig. 2 (type-locality?).

Elaps intestinalis: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 1028.

Elaps tri-lineatus Duméril and Bibron, Erpétologie générale . . . vol. 7, 1854, pp. 1227-1228, (type-locality, Padang, west coast of Sumatra).

Elaps melanotaeniata Bleeker (named by Boulenger, in Catalogue of snakes, vol. 3, a synonym of *nigrotaeniata*? p. 403.

Callophis intestinalis: Günther, The reptiles of British India, 1864, pp. 348-349.

Adeniophis intestinalis: Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, pp. 386-387, (Burma, Malay Peninsula and Archipelago).

Doliophis intestinalis: Boulenger, Catalogue of the snakes of the British Museum, vol. 3, 1896, pp. 401-404; A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore; Reptilia and Batrachia, 1912, p. 206; Flower, Proc. Zool. Soc. London, 1899, p. 693; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 253-254, fig. 96, (5 "varieties" shown).

Maticora intestinalis: Sworder, Singapore Nat., no. 2, 1922, p. 22; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1922, p. 267; Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 163; Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, p. 60, (Nakhon Si Thammarat); Bull. Raffles Mus., no. 3, 1930, p. 69; Tweedie, Snakes of Malaya 1954, pp. 95-96; Wegner, Pengemar Alam, vol. 34, 1-2, 1954, pp. 55-58, 2 figs. (not seen).

Doliophis intestinalis var. *annectens* Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 402, (type-locality Singapore and Labuan. Here restricted to the former locality).

Doliophis intestinalis everetti Boulenger, *ibid.*, p. 404, (type-locality, Kina Balu, North Borneo).

Doliophis intestinalis vertebralis Werner, Zool. Jahrb. Syst., vol. 13, 1900, p. 491 (type-locality, Sumatra).

Elaps thepassi Bleeker, Nat. Tijdschr. Nederland Indië, vol. 22, 1859, p. 201 (type-locality, Sintang, Borneo).

Elaps Sumatranus Lidth de Jeude, in Weber, Zool. Ergebnisse, vol. 1, 1890, p. 1 (type-locality, Sumatra).

Callophis furcatus var. *nigrotaeniatus* Peters Monatsb. K. Akad. Wiss. Berlin, 1863, p. 404, (type-locality, Kepahiang, Sumatra).

Callophis intestinalis var. *malayana* Günther, The reptiles of British India, 1864, p. 349 (type-locality, Malayan peninsula "Pinang," Singapore, Central India (Malwali) here restricted to Penang, Malaya).

Callophis intestinalis suluensis Steindachner, Sitzb. Akad. Wien, vol. 100, 1891, pp. 293-295 (type-locality, Sulu Islands).

Doliophis intestinalis immaculata Loveridge, Proc. Biol. Soc. Washington, vol. 57, 1944, pp. 105-106 (type-locality, Marudi, Baram River, Sarawak, Borneo).

Maticora intestinalis intestinalis (Laurenti)

(Fig. 91)

Diagnosis: A small snake (580 mm.) with elongate poison-gland extending into and occupying space in anterior third of body. Scales smooth, without pits, in 13 rows. Body with seven yellowish and eight black longitudinal lines; venter barred with black and greenish yellow; subcaudal region coral-red, with one or two black bars; subcaudals divided; anal single.

Description of species (from No. 34428 ♀, Na Pradoo, Pattani province Thailand): Rostral narrowly visible above, as high as wide; internasals half as large as prefrontals, terminating laterally in a point; prefrontals relatively large; frontal a little longer than wide, longer than its distance from tip of snout, shorter than parietals; supraoculars less than half width of frontal; nostril large, between two nasals, anterior much the larger; no loreal; one preocular, two postoculars; six supralabials, third and fourth entering orbit, (seven on left side due to an intercalated scale between fourth and fifth); temporals, 1 + 2, anterior largest, touching both postoculars; eye diameter less than its distance from mouth; six infralabials, last two largely concealed by last supralabial; four labials touch anterior pair of chinshields which are not or scarcely larger than second pair.

Scales in 13 rows throughout body; across occiput there are 17. No keels or apical pits present. Ventrals, 240; subcaudals, 24; anal, single.

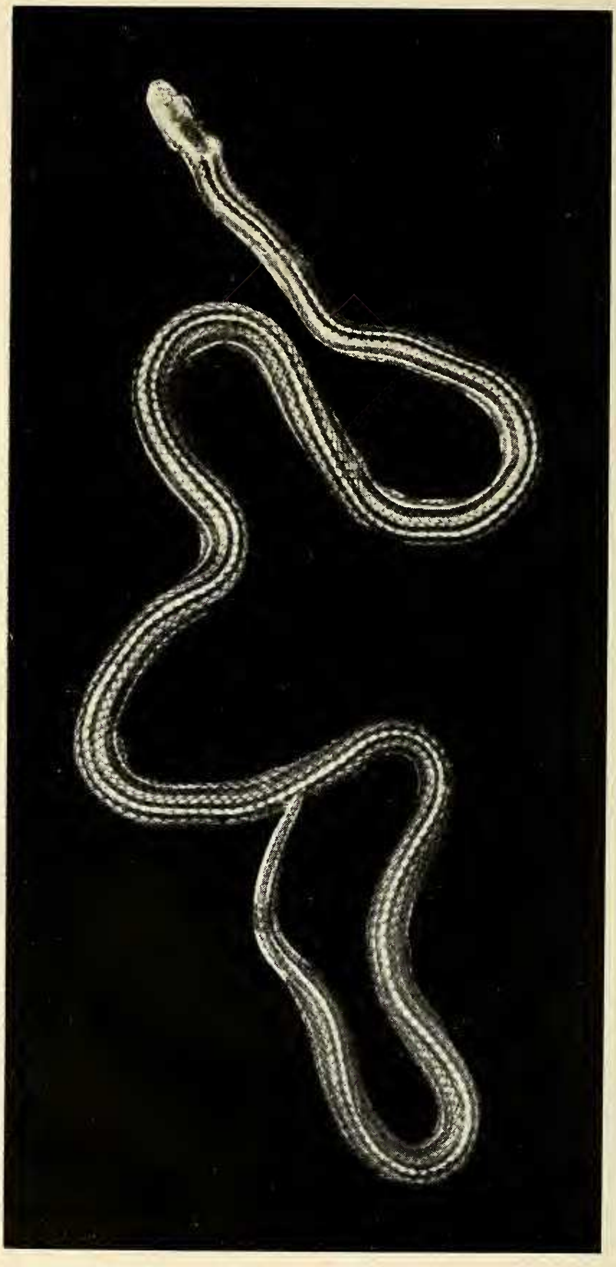

FIG. 91. *Maticora intestinalis intestinalis* (Laurenti). No. 34428 ♀, Na Pradoo, Pattani province. Actual total length, 343 mm.

Color in life: Head variegated black and brown, with some indefinite pinkish spots on prefrontals; labials olive with blackish flecks; median dorsal scalerow rosy, each scale with a coral-red chevron in its latter half; on tail median row drops out and there is a zigzag line of coral between two enlarged median scalerows on tail; median dorsal line bordered on each side with a black line one and a half scales wide, below which is a yellowish-brown line comprising one scalerow and adjoining edges; below this another black stripe, bordered by a cream line between two outer scalerows; outermost row black. Thus eleven stripes are evident.

Tip of chin gray-black; remainder of chin and throat whitish for half an inch, followed on venter by 39 black quadrangular bars separated by an equal number of greenish-yellow bars; subcaudal region coral-red, with a single incomplete dark bar.

Measurements in mm.: Snout to vent, 343; tail, 23; total length, 366; width of head, 5; length of head, 8; width of body, 5.5.

Variation: A second specimen examined in the private collection of Nai Prayoon Kananuracks has the following characteristics: The specimen is faded but agrees generally in color and pattern with the specimen described. Ventrals, 234 ♂; subcaudals, 24; anal, single. There are 35 black ventral bars on body, with one distinct bar on tail. The length in mm. is 446 ± (the specimen coiled and difficult to straighten); width of body, 8 mm.; width of head, 7; length of head, 9.5.

The close agreement between this male and the described female specimen is noteworthy.

One judges by the literature that *Elaps intestinalis thepassi* Bleeker and *Callophis intestinalis malayanus* Günther are synonyms of this form.

Distribution: In Thailand this form is known in Pattani and Yala. Outside of Thailand it has been reported in Malaya and Borneo.

Remarks: The species when disturbed will turn on its back, showing the brilliant ventral coloration, then flop about erratically, sometimes actually throwing its body from the earth. I have not seen it attempt to bite.

The described individual was routed from a small termite-riddled piece of a log in a grove of rubber trees.

Genus *Calliophis* Gray

Calliophis Gray, Illustrations of Indian Zoology, vol. 2, 1834, p. 86, fig. 1 (type of genus, *Calliophis gracilis*).

Diagnosis: Body rather cylindrical, elongate, not tapering posteriorly; tail short; scales smooth; no apical pits; scales in 13 or 15 rows; subcaudals paired. Head not distinct from neck, head-scales normal except loreal absent; nasal divided; eye small with round pupil; poison-fangs followed by from one to five small maxillary teeth (or none in *gracilis* and *macclellandii*).

Malcolm Smith has united the genera *Hemibungarus* with *Calliophis,* the wisdom of which may be questioned. The type species of the latter has no small maxillary teeth behind the large grooved fang. *Hemibungarus* has small maxillary teeth in varying numbers so placed. It would appear that the presence of teeth other than the fangs might be regarded as a generic character. A review of this matter is to be desired. I have made no change in Smith's arrangement since sufficient materials are not at hand for such a task.

Five forms are known in Thailand.

KEY TO SPECIES AND SUBSPECIES OF *Calliophis* IN THAILAND

1.	Temporals 1 + 1, the anterior touching two supralabials; no maxillary teeth present behind the enlarged fangs	2
	Temporals one, the anterior touching three supralabials	3
2.	Ventrals 182 to 224, subcaudals 21 to 31	*m. macclellandii*
	Ventrals 303 to 320; subcaudals 21 to 28	*gracilis*
3.	Ventral shields, 174-203; subcaudals, 21-31	4
	Ventral shields, 285; coloration uniform without line or spots on body; blue under tail	*hughi*
4.	Light brown with a median vertebral black line and lacking black spots on the body; ventrals, 184 ±; (*univirgatus* not of Günther)	*m. malcolmi*
	Light brown with small or larger distant black spots, usually paired, larger and smaller ones alternating; head black with paired yellow spots; two black rings on tail, gray or blue on underside; ventrals, 174 to 203,	*m. maculiceps*

Calliophis macclellandii macclellandii (Reinhardt)

(Fig. 92)

Elaps macclellandii Reinhardt, Calcutta Journ. Nat. Hist., vol. 4, 1844, p. 532 (type-locality, Assam); Vidensk, Medd. Naturh. Foren. Kjöbenh, 1860, p. 247.

Callophis macclellandii: Günther, Proc. Zool. Soc. London, 1861, p. 218; Reptiles of British India, 1864, pp. 349-350; Boulenger, The fauna of British India, including Ceylon and Burma, Reptilia and Batrachia, 1890, p. 385; Ann. Mus. Civ. Genova, ser. 2, vol. 13, 1893, p. 327; Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 398-399; Acton and Knowles, Indian Journ. Med. Res., vol. 2, 1914, p. 56; Annandale, Rec. Ind. Mus., vol. 8, 1912, p. 50; Sclater, List of the snakes in the Indian Museum, Calcutta, 1891, p. 56; Venning, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910, p. 342; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1901, p. 612; *ibid.,* vol. 18, 1908, pp. 333 and 780; vol. 19, 1909, p. 356; and vol. 22, 1913, p. 639; vol. 25, 1918, p. 628, colored pl. and vol. 31, 1926, p. 566; Poisonous snakes of India, 1928, p. 31, fig.; Pope, Reptiles of China, 1935, p. 406, fig.; M. Smith, Fauna of British India, including Ceyon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 423-425, fig. 135.

Elaps personatus Blyth, Jour. Asiat. Soc. Bengal, vol. 23, 1855, p. 298 (type-locality, Assam).

Callophis annularis Günther, Reptiles of British India, 1864, p. 350, pl. 24, fig. I (or J) (type-locality, "India").

Diagnosis: A relatively small snake (812 mm.). Body cylindrical, head scarcely distinct from neck; scales in 13 rows; preocular separated from nasal. Temporals, 1 + 1, the anterior shield touching two labials; seven supralabials. Reddish or red-brown above, with regular transverse narrow black bands or bars which may not reach belly; head largely black above with a broad cream band across head behind eyes; yellowish below with black bands or bars covering one to four ventrals. Tail short, ringed with several black bands. A large fang but no other teeth on maxillary; anal normally divided.

Description of species (from No. 33637, Doi Suthep, Chiang Mai): Rostral wider than high, only narrowly visible above; internasals broader than long; prefrontals larger than internasals, broader than frontal; latter scale longer than its distance from snout, shorter than parietals; supraoculars more than half width of frontal; nostril between two nasals; but chiefly in anterior; suture below nostril passing to second labial; no loreal; large preocular touching posterior nasal, separating labials from prefrontal; two postoculars, both touching first temporal; temporals, 1 + 1 + 2; first touching fifth and sixth supralabials; seven supralabials, third and fourth border orbit; six infralabials, four touching anterior chinshields, which are larger than second pair.

Scalerows: 15 (occiput), 13, 13, 13; scales smooth, outer row largest, all lacking pits; ventrals, 207; subcaudals (paired), 33; anal, divided.

Color in life: Body reddish above (red-brown in preservative); venter yellowish to saffron with 24 narrow black bands around body, one, to one and one-half scalerows in width some broken ventrolaterally; tail with five rings, and two black spots on subcaudal area between rings; on venter, black spots covering from two to four ventrals; many body bands are broken low on side; head black, tip of snout lighter; snout and part of frontal area dark; a broad ivory-white band behind eyes, anterior border convex, posterior border undulating, followed by a broad black band;

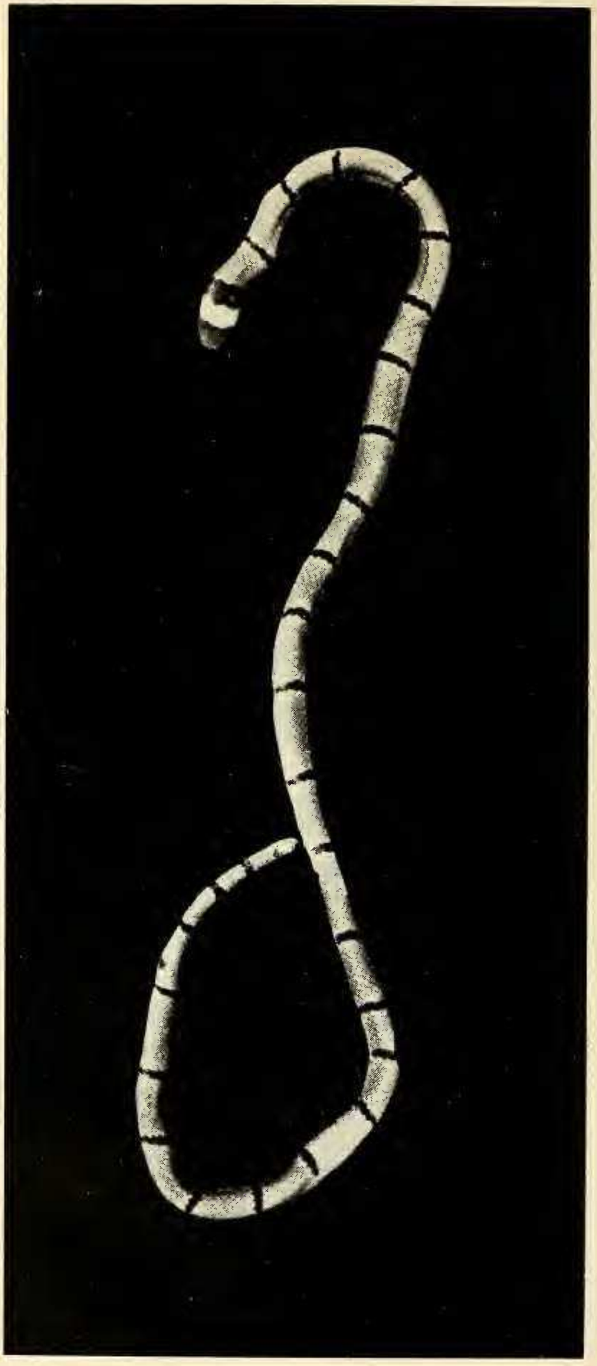

FIG. 92. *Calliophis macclellandii maclellandii* (Reinhardt). No. 33637♂, Doi Suthep, Chiang Mai, Thailand. Actual length, 266 mm.; tail, 26 mm.

which in turn is followed by a fine yellowish line; chin yellowish white with a dim median dark spot; venter yellowish with black cross-bars or spots.

Measurements in mm.: Total length, 266; snout to vent, 240; tail, 26; head-width, 4.8; head-length, 9; body-width, 5.

Variation: Malcolm Smith has placed several forms (*m. univirgatus, m. nigriventer, m. gorei* and *m. concolor*) as synonyms. It seems likely that some of these may represent related species or subspecies.

The specimen of the typical form figured by Wall (1918) and that by Malcolm Smith (1943) differ slightly, from the described specimen. The nuchal black bar forms a mesial angle anteriorly that almost touches the frontal and extends back on neck covering most of three scalerows. In my specimen the black band has two salient points on the parietals rather than a single mesial one.

The ventrals vary between 182 and 240; subcaudals, 20 and 36 pairs. The number of rings encircling the body varies from 16 to 35; the caudal bands from two to five in Indian specimens.

Distribution: The distribution of the so-called color variants is as follows: a form *nigriventer,* western Himalayas; *univirgatus,* Nepal and eastern Himalayas; *gorei,* Naga Hills in Assam and Manipur; and *m. macclellandii,* Assam, Burma, Formosa, and China.

This is probably the first and only report of the species in Thailand. A second specimen (EHT-HMS No. 36538, is a gift from Mr. Oliver Gordon Young. The snake was collected on Doi Suthep near Chiang Mai. There are 29 rings about the body, each about the width of one scale; four rings on tail. Only an occasional ring is broken ventrolaterally. The tail ends in a semirigid spine. The ventrals are 228; the subcaudals, 30; the anal is divided.

Calliophis gracilis Gray

Calliophis gracilis Gray, Illustrations of Indian Zoology, vol. 2, 1834, pl. 86, fig. 1 (type-locality, Penang Island, Malaya).

Callophis gracilis: Günther, Proc. Zool. Soc. London, 1859, p. 83; Reptiles of British India, 1864, p. 349 (remarks that the figure of dentition given by Gray is incorrect); Peters, Monatsb. K. Akad. Wiss. Berlin, 1871, p. 579; Meyer, Sitzungsb. Akad. Wiss. Berlin, 1886 p. 614; Boulenger, Catalogue of the snakes in the British Museum 2nd Ed. vol. 3, 1896, pp. 396-397 (Penang, Singapore and Sumatra); A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 203-204; Sworder, Singapore Nat., no. 2, 1922, p. 72 (Singapore); M. Smith, Bull. Raffles Museum, no. 3, 1930, p. 68; Tweedie, The snakes of Malaya, 1954, p. 93.

Elaps nigrocinctus Cantor, Proc. Zool. Soc. London, 1839, p. 33 (type-locality, Singapore; Catalogue of Malayan Reptiles 1847, p. 108, pl. 40, fig. 7.

Elaps gracilis: Günther, Catalogue of the Snakes in the British Museum, 1858, p. 230.

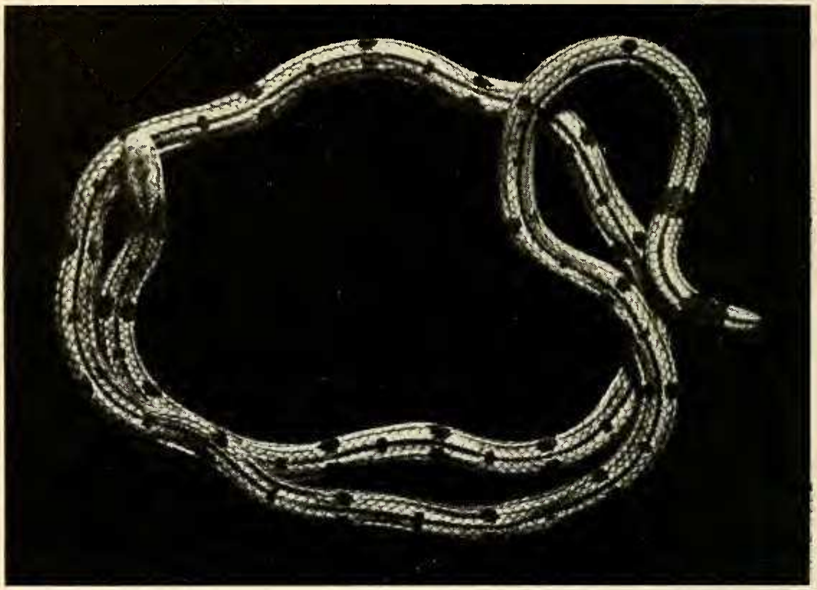

FIG. 93. *Calliophis gracilis* Gray. C.U. No. 3170, Na Pradoo, Pattani, province, southern Thailand. Actual total length, 355 mm.; tail, 21 mm.

Diagnosis: A very slender gray snake with a narrow median black line and four lateral black lines. A pair of large nuchal spots followed by a paired series of 25, rounded dorsolateral spots on body, each covering four or five scales; at intervals between pairs a single series of smaller spots interrupts the median black line; tail with two wider complete bands; tail ending bluntly in a large rounded black scale. Venter barred with 50 deep black spots separated by somewhat larger ivory-white bars; under tail the ivory-white spaces are wider; laterally on tail only two black stripes.

Description of species (from no. 3107, Na Pradoo, Pattani): Body slender, the width in length about 89 times; head distinctly flat above; tail ending bluntly. Rostral about as high as wide, the part visible above, triangular; internasals distinctly smaller than prefrontals, wider than long, pointed laterally; prefrontals relatively large, nearly as large in area as frontal; frontal a little longer than wide, shorter than its distance to tip of snout, much shorter than parietals; supraoculars about four-fifths as wide as frontal; parietals elongate, their length equal to their distance from tip of snout; nasal divided, anterior part much the larger; a preocular diagonally elongated; two postoculars, both touching the very large single anterior temporal; temporals, 1+1+1; parietals sharply truncate, followed by two scales larger than body-scales; six supralabials, first smallest, last largest, third and fourth bordering orbit; mental nearly triangular, its labial border equal to rostral border; first infralabials in contact; first pair of chinshields as long as, but wider than, second pair; seven infralabials, fourth largest, first four border first chinshield. Scale-formula: 20 (occiput), 13, 13, 13; no apical pits; around tail near base, eight scales; at terminus, six. Ventrals, 306; anal, divided; subcaudals, 28, paired.

Color: Color gray to brownish gray, lighter on sides and lower down nearly white. A narrow median black stripe from head to tip of tail, not entirely covering median scalerow, the borders straight; it bifurcates anteriorly sending two short arms on parietals; this stripe bordered by a grayish one covering one whole scalerow and edges of the median row and more than half of a second row; a brownish black stripe on edges of fourth and fifth scalerows arising from black nuchal spots and continuing to tip of tail; upper edges of third scalerow brownish gray, the middle with whitish dashes, lower part deep black; first and second rows deep black, each scale with a white dash which, together with those on third row, form three dashed white lines. On tail only a single continuous white line bordered by black lines. A pair of large lateral nuchal spots followed by a series of 25 lateral paired spots terminating at vent, and a median series of somewhat smaller spots interrupting median line. Larger lateral spots covering four or five scales, smaller median spots one or two scales. Venter with chin and part of throat flecked with gray-black; front of neck ivory.

Transverse black bars begin at about 9th ventral and continue to tail, 51 in all. At first one or two ventrals are covered, but the spots cover three ventrals for the most part; the intervening ivory to cream-white spots cover three ventrals (rarely four); undersurface of tail ivory with two bands encircling tail. Terminal caudal scale black, rounded. An irregular light stripe on supralabials partly edged with black; anterior head scales with darker areas. A distinct black bar from eye to temporal region.

Measurements in mm: Total length, 355; tail, 21; width of head, 3.8; length of head, 6.1; width of body, 4; width of body in total length, about 89 times.

Remarks: This presumably is the first record of this species in Thailand. It probably reaches but a short distance into the country. The obvious differences between this species and *C. maculiceps* are such that there is small likelihood that they could be confused.

Calliophis hughi Cochran

Callophis hughi Cochran, Proc. Biol. Soc. Washington, vol. 40, Dec. 2, 1927, pp. 190-191 (type-locality, Koh Tao, Gulf of Siam); Proc. U. S. Nat. Mus., vol. 77, 1930, p. 37, fig. 6; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 421.

Diagnosis: One pre- and two postoculars; seven upper labials; ventrals, 285; a single temporal; body immaculate reddish-brown above, extreme edges of each scale powdered with minute gray dots.

Description of species (from type-description): Rostral broader than deep; internasals smaller than prefrontals, their common suture about half of that between prefrontals; frontal with sides nearly parallel, distinctly broader than supraocular, as long as its distance from end of snout, much shorter than parietals; nasal divided; a preocular entering upper anterior part of orbit, and two postoculars, both touching anterior temporal; temporals, 1 + 2; seven supralabials, third and fourth border orbit; infralabials eight, four touching first chinshield (however the second is excluded); second chinshield smaller than first.

Scalerows: 13, 13, 13; ventrals, 285; subcaudals, 27; anal, divided.

Color: Body above nearly uniform immaculate reddish brown, scale-edges with gray pigment; anterior part of venter cream, becoming pink posteriorly. At base of tail a complete black ring; then four irregular spots on undersurface of tail and near the tip another black ring which is not complete above; the top of head entirely black excepting for outermost portions of parietal region and outer halves of internasal plates, which are light brown. The black nuchal mark does not completely surround the neck, but covers the nape and ends below the commissure of the mouth. Sutures between anterior labials of upper and lower jaw are marked by black, the most decided mark coming between third and fourth labials; behind this point labials entirely white.

Measurements in mm.: Total length, 260; tail, 26.

Remarks: Dr. Cochran states that its nearest relative is *C. maculiceps,* that it has a much lower number of ventrals, and that dots or spots are absent on back. An island form known only from the type.

Calliophis maculiceps Günther

There are two or three varieties of this species found in Thailand. The material available does not permit the recognition of more than two subspecies. Certain of the variants are figured.

Calliophis maculiceps maculiceps Günther

(Figs. 94, 95, 96)

Elaps maculiceps Günther, Catalogue of the colubrine snakes in the British Museum, 1859, p. 232 (type-locality, "East Indies"); Theobald, Journ. Linn. Soc., vol. 10, Zoology, 1868, p. 62.

Callophis maculiceps: Günther, Proc. Zool. Soc. London, 1859, p. 84, pl. 16, fig. D; The reptiles of British India, 1864, p. 351; Boulenger, The fauna of British India, including Ceylon and Burma; Reptilia and Batrachia, 1890, p. 384; Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 397-398; Laidlaw, Proc. Zool. Soc. London, 1901, pt. 2, p. 580; Boulenger, A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore; Reptilia and Batrachia, 1912, p. 204; Wall and Evans, Journ. Bombay Nat. Hist. Soc., vol. 13, 1900, p. 344; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, pt. 3, Mar., 1915, p. 214; Gyldenstolpe, Küngl. Sven. Vet-Akad., vol. 55, 1916, pt. 3, p. 26; Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 244; The poisonous snakes of India, 1928, p. 31, fig.; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, pt. 2, 1914, pp. 123-124 (varieties); M. Smith, Bull. Raffles Mus., Singapore, no. 3, Apr., 1930, p. 68 (Khao Ronpibun, Nakhon Si Thammarat); M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, May, 1923, p. 59; Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 37; Bourret, Les serpents de l'Indochine, 1936, p. 403; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 420-421.

Elaps melanurus: Cantor, Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 1027, pl. 40, fig. 6 (not of Shaw).

Elaps atrofrontalis Sauvage, Bull. Soc. Phil. Paris, ser. 7, vol. 1, 1877, p. 111 (type-locality, Cochin China).

Diagnosis: A small slender snake reaching a length of little more than half a meter; one preocular, two postoculars; seven supralabials; one temporal, touching three labials; one preocular touching nasal; scales in 13 rows.

Reddish or gray-brown with paired dark spots on each side, between which are smaller pairs; two black bands encircle tail; belly pink; subcaudal region blue with black spots.

Description of species (from specimen 1, Royal Forest Department, Ban Na Kom, Khao Luang): Rostral a little wider than high, well visible above; internasals slightly wider than long, angular anteriorly; prefrontals little wider than long, nearly double area of internasals, forming an angle on side; frontal hexagonal with sides parallel, its length slightly less than its distance from tip of snout, less than its distance from end of parietal; parietals rather large, their tips separated posteriorly by a scale; two nasals, anterior larger; one preocular, touching posterior nasal, separating prefrontals from labials; two postoculars, both touching temporal; anterior temporal very large, broadly in contact with three posterior supralabials; seven supralabials, first smallest, last largest, third and fourth bordering orbit; eye moderate, its diameter slightly

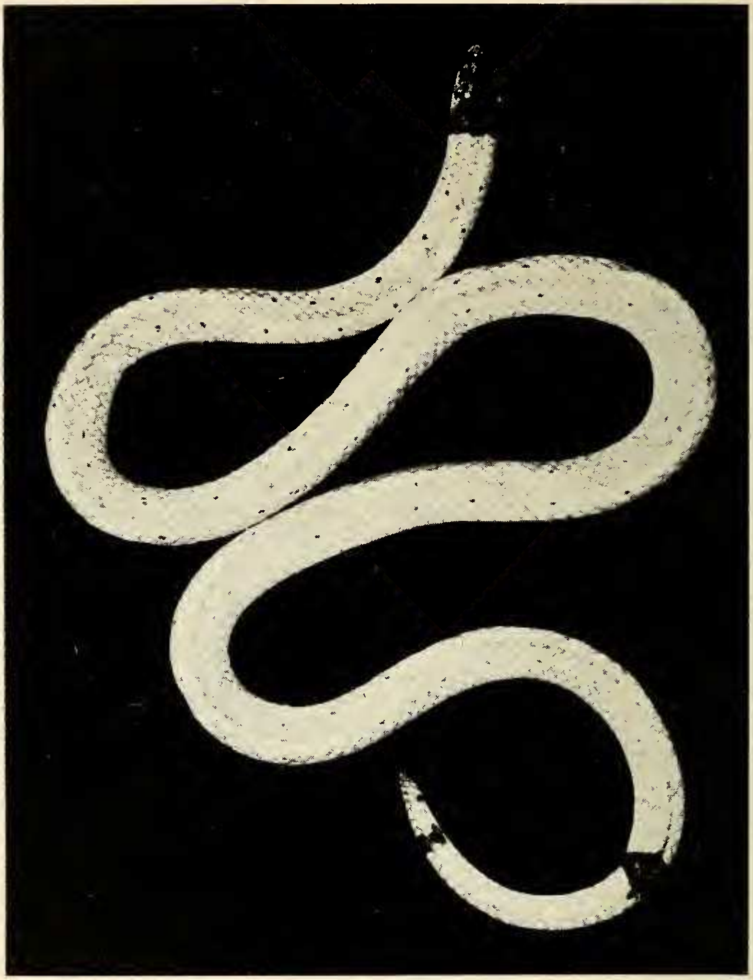

FIG. 94. *Calliophis maculiceps maculiceps* (Günther). No. 34216, Bang Saen, Chon Buri, Thailand. Actual total length, 305 mm.; tail, 32 mm.

less than its distance from mouth; secondary temporal large, bordering parietal, separated from its fellow by three scales behind parietals. Mental triangular; first chinshields a little larger than second pair, and bordered by five infralabials; seven infralabials; an enlarged scale touching second chinshield and last three infralabials.

Scale formula: (♂) 17 (head), 13, 13, 13; scales smooth, without pits. Ventrals, 198, anal, divided, subcaudals, 30, paired (except terminal one).

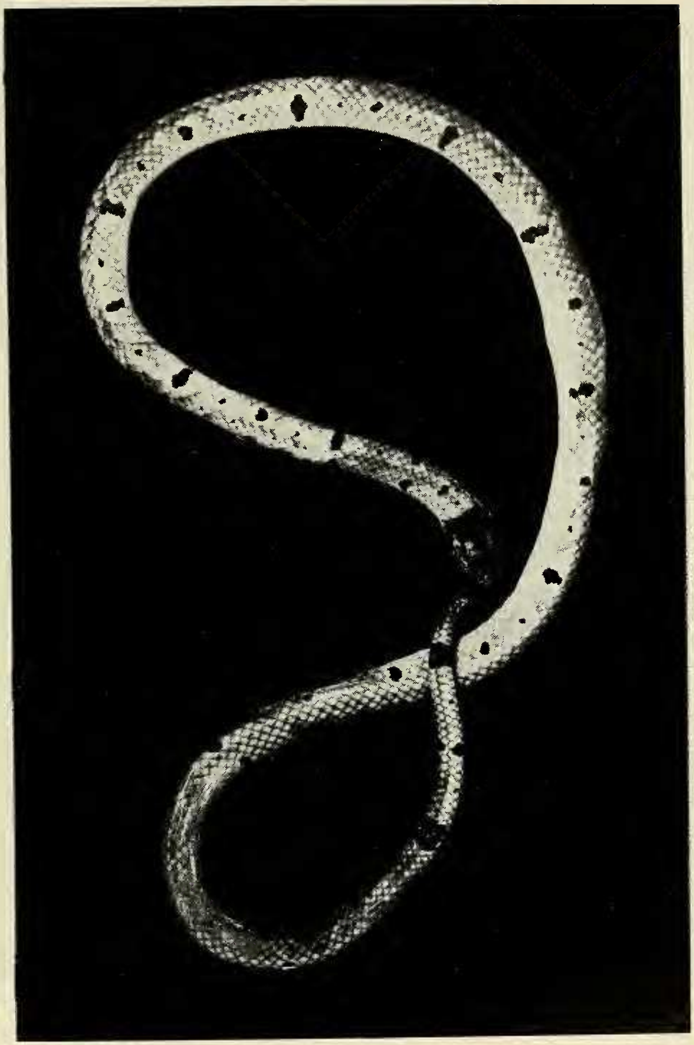

FIG. 95. *Calliophis maculiceps maculiceps* Günther. No. 1, Royal forest department, Khao Luang, Thailand. Actual total length, 318 mm.; tail, 33 mm.

Color: Head rather dark olive anteriorly with inconspicuous lighter areas on scales of snout; a black bar, three or four scales wide, across occiput, with a median process reaching frontal. Lighter areas on parietals and second temporal; whitish spot covering last three supralabials and part of first temporal; body above brown, growing lighter laterally and gradually becoming pink below; black spot on neck truncate behind; paired lateral

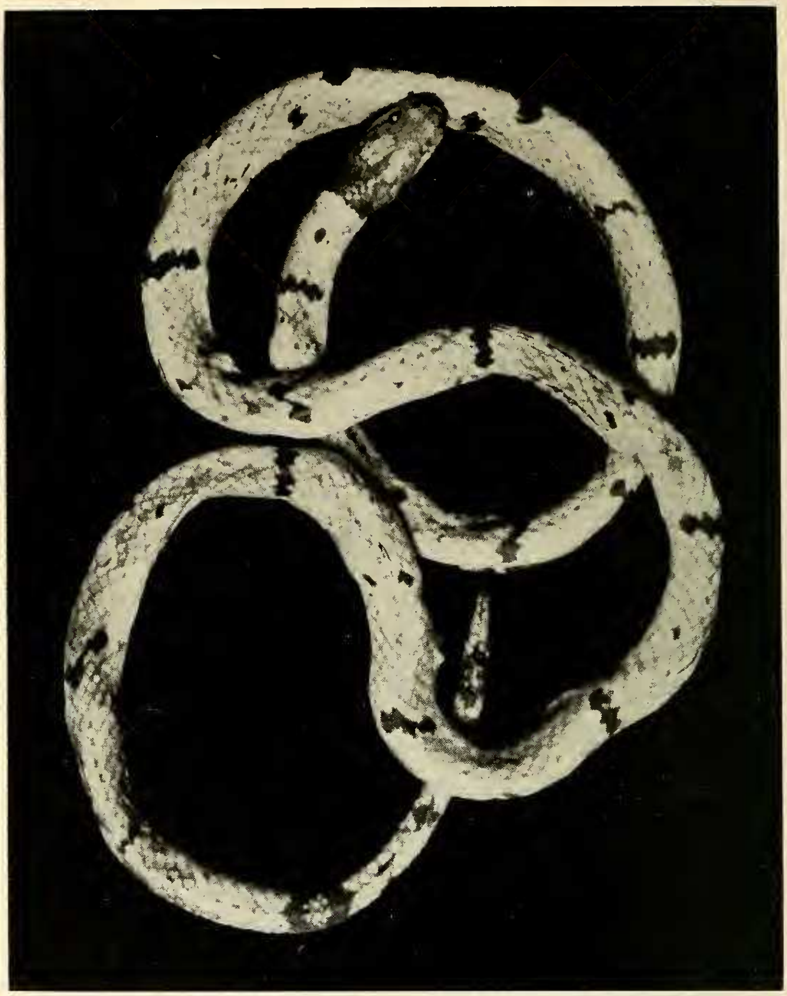

FIG. 96. *Calliophis maculiceps maculiceps* (Günther). No. 3869 Na Pradoo, Na Pradoo, Pattani, Thailand. Enlarged somewhat.

spots somewhat lighter-edged extending length of body with smaller black dots intercalated; two black bands surround tail, the first narrowed below; venter, from chin to vent, reddish or pink; subcaudal region gray-blue with numerous black flecks.

Measurements in mm. (two specimens from same locality, Khao Luang): Snout to vent, 318, 308; tail, 33, 33; total length, 351, 341; head-width, 6, 6; head-length, 9.2, 8.8.

Variation: The second specimen measured above, has 201 ventrals, and 30 subcaudals; the color and marking are almost identical with the preceding.

Remarks: The specimen described contained a partially digested *Typhlops*, of which the anterior part of the body and head were missing, while the posterior part was in a fair state of preservation. This part was black above, white below, with 24 scalerows present around the body. The tail is white, the colors in strong contrast. The diameter of the body is 4.1 mm. The undigested portion measures 83 mm. in length. I cannot identify the *Typhlops* with species known from Thailand.

Theobald (1868) records the markings of a specimen from Rangoon as follows: Uniform pale brown with a chain of 36 distant, not very distinct black dots down each side. Crown of head black, giving off a broad streak behind eye and uniting with a black collar on the nape. A subterminal black ring on tail and a broader one at the base expanded above into a rhomboidal escutcheon, with a median line down the tail on its dorsal surface.

Two specimens are available from Na Pradoo, Pattani. Each has 197 ventrals and 27-28 subcaudals, the tails ending in a sharp pointed spine tending to turn down.

A figured specimen (Fig. No. 34216), has the smallest spots of any specimen examined. I captured it at Bang Saen from under the bark of a small log. The colors of the living specimen were reddish-pink above with paired or alternating fine black dots on sides. A rather large rhomboidal black spot formed a band around the base of the tail; a small spot near the tip. Below, dirty white on chin and at beginning of throat, then gradually becoming pinkish and later orange. Near the tail tip the orange

Table of data on *Calliophis maculiceps maculiceps* Günther

NUMBER	Sex	Locality	Ventrals	Subcaudals
102985	♀	Chiang Mai	199	26
33636	♀	Chiang Mai	198	28
70331	♀	Nong Khai	192	21
24027	♀	Trang	192	29
1427	♀	Na Pradoo	196	27
101519	♂	Chiang Mai	185	32
3869	♂	Na Pradoo	184½	30
34216	♂	Bang Saen	177	29
812	♂	Loc. uncertain	198	30

is intense. It is white under the tail, the head an intense black above, the sides with some cream or whitish spots connecting with color under chin. Some black and yellow flecks are present on front of chin.

Calliophis maculiceps malcolmi nov. nom.

(Fig. 97)

Callophis maculiceps univirgatus, M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, Aug. 1914, p. 123 (type-locality Nong Kai Ploi, Thailand) not *Elaps univirgatus* (Günther) 1859; Journ. Bombay, Nat. Hist. Soc., vol. 23, May 25, 1915, pp. 786-787.

Diagnosis: Yellowish brown with a conspicuous black vertebral line running whole length of body and tail.

Description of species (from No. 33197 near Sara Buri, Sara Buri province, Central Thailand [*]): Rostral broader than high, the part visible above triangular; internasals less than half area of prefrontals their mutual suture about half that of prefrontals; frontal with sides parallel, length equal or slightly greater than its distance from tip of snout; nasal divided, nostril almost wholly in anterior nasal which is larger than posterior part; a preocular, two postoculars; temporals destroyed; labials and part of lower jaw missing.

Scalerows: 13, 13, 13, smooth without apical pits; ventrals, 184±, subcaudals, 21; anal, divided; upper jaw bearing two grooved fangs followed by a diastema, and this followed by three small teeth; on lower jaw, two larger mandibular teeth followed by a diastema and this by six small teeth.

Color in life: Olive above; below coral pink on venter, for two or three centimeters in front of tail, deep tomato-red. A sharply distinct median black stripe from head to tip of tail. A black band at base of tail wider dorsally than ventrally; a second black band near tip; subcaudal area deep blue-black with some bluish-white spots. Dorsum and sides generally olive with a sharply marked median black line covering most of the median scalerow and a mere part of the edges of adjoining rows; A blackish band on neck and occiput; venter pinkish anteriorly changing to rosy pink then to tomato-red preceding vent. Top of head with some darker and lighter markings, the spotting not distinct.

The color in preservative is lavender brown, the scale-centers light fawn or dull cream; venter white.

Measurements in mm.: Total length, 306 ±; tail 24 ±.

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[*] This specimen captured within two hundred meters of Friendship Highway in an open field near buildings, was taken alive and kept for several days. While being photographed the specimen was stepped on and killed, destroying a part of the head. Such characters as are apparent are recorded.

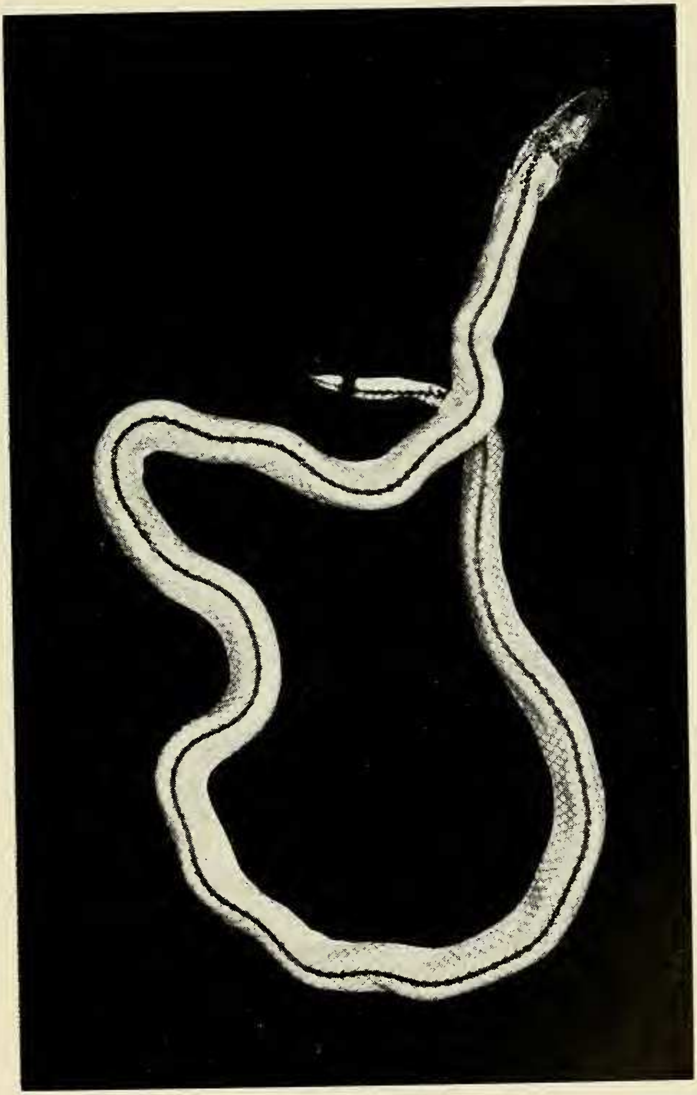

FIG. 97. *Calliophis maculiceps malcolmi* nov. nom. No. 33197, near Sara Buri, Sara Buri province, Thailand. Actual total length, approximately 306 mm. ±; tail, 24 mm. ±.

Distribution: Known only from central and southeastern Thailand. The described specimen is from Sara Buri province.

FAMILY HYDROPHIIDAE

Hydrophidae Boie, Isis, 1827, p. 410.

Diagnosis: Body more or less compressed, tail strongly compressed and vertically widened. Nostrils on dorsal surface of snout except in Laticaudinae; pupil round; tongue short, only cleft portion extrusible. Poison-glands and fangs present on maxillary followed by ungrooved maxillary teeth; neural spines and hypapophyses strongly developed in caudal region.

Two subfamilies are recognized and may be differentiated by the following key:

KEY TO SUBFAMILIES OF HYDROPHIIDAE

1. Maxillary bone extending forwards beyond palatine; ventrals large, one third to more than half width of body. Snake capable of crawling on land and spending considerable time out of the water .... *Laticaudinae*
2. Maxillary bone not extending forwards beyond the palatine except in *Kerilia* and *Microcephalophis*; ventrals small not more than one-fourth the width of body, or very small or absent; snakes practically unable to crawl on land .... *Hydrophiinae*

Subfamily LATICAUDINAE

Representatives of two genera belonging to this subfamily are found in Thai waters; they may be differentiated as follows:

KEY TO THE THAI GENERA OF THE LATICAUDINAE

Nostril lateral, nasals separated by internasal (single or divided) ..... *Laticauda*
Nostrils on top of snout, nasals in contact with one another ...... *Aipysurus*

Genus *Laticauda* Laurenti

Laticauda Laurenti, Specimen medicum exhibens synopsin, reptilium emendatum, 1768, p. 109 (type of genus *L. scutata,* substitute name for *C. laticaudatus* of Linnaeus).

Platurus Latreille, Histoire Naturelle des Reptiles, vol. 4, 102, p. 183, (type of genus *P. fasciatus* = *laticaudata*); Boulenger, Catalogue of the snakes in the British Museum, 2d Ed vol. 3, 1896, p. 306.

Diagnosis: Maxillary bone much shorter than ectopterygoid, extending forward beyond palatine; poison-fangs followed after an interval by one or two teeth. Head shields complete, large; nostrils lateral, nasals separated by internasals. Scales smooth, imbricate; ventrals large, half width of body; females larger than males, with shorter tails.

There are four recognized species in this genus, two of which have been reported from waters adjacent to Thailand. These are

Laticauda colubrina and *Laticauda laticaudata*. These forms may be distinguished by the following key:

KEY TO THAI SPECIES OF *Laticauda*

1. Scalerows about body, 19; no azygous shield between prefrontals; upper lip dark brown .... *laticaudata*
   Scalerows about body 21-25; normally an azygous shield between prefrontals; upper lip yellow .... *colubrina*

The snakes of this group are large and at least two species *semifasciata* and *colubrina* are said to be oviparous.

I have seen very large numbers of the serpents identified as *L. colubrina* on the small island of Bubuan, Sulu Archipelago. Here I have observed large females, with large broods of young, presumably born alive.

The species of this genus are able to crawl on land with considerable ease, due to their widened ventrals. They are not aggressive and may be picked up by their tails or otherwise handled with impunity.

Skins of these snakes are sought by skin collectors who find a ready market for them. They are used for the manufacture of leather goods.

Since these snakes tend to be gregarious at certain seasons they often are taken in large quantities. In the Philippines they are protected by the government. The late Dr. Albert W. C. T. Herre studied the ecology of these snakes in the Philippines, and in a report by Herre and Rabor* states "About 1923 the senior author discovered that the Riu Kiu fishermen operating in the Philippines were catching members of *L. semifasciata* and eating them. Those not eaten at once were kept alive in unglazed earthen jars until wanted for food. . . . Some of the fishermen began to make special effort to catch sea-snakes for two purposes: one, to sell their skins for making leather; two, to sell their flesh for food. . . . At the present time the Philippine Bureau of Fisheries controls the taking of snakes at Gato (island). A Filipino concessionaire has been given a monopoly for 20 years. He pays a tax on each kilo of skins ready for shipment."

"Snakes that are eaten by the Japanese are spitted on pointed bamboo. This makes the snake stiff and easy to handle. Most of the snakes are then roasted and smoked, or prepared in the same way as smoked fish. They are usually eaten with soy sauce and various condiments and are then said to be very palatable."

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* Herre and Rabor, Copeia, 1949, No. 4, Dec. 15.

Laticauda colubrina (Schneider)

(Fig. 98)

Hydrus colubrinus Schneider Historiae amphibiorum naturalis et literariae, fasc. 1, 1799, pp. 238-240 (type-locality unknown).

Hydrophis colubrinus: Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 514, pl. 18. (*part.*).

Platurus colubrinus: Girard, Herpetology of the U. S. Exploring Expedition, 1858, p. 183; Peters, Monatsb. Akad. Wiss. Berlin, 1877, p. 420; Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed, vol. 3, 1896, pp. 308-309, fig.; A vertebrate fauna of the Malay Peninsula . . .; Reptilia and Batrachia, 1912, p. 197; Boettger, Katalog der Reptilien-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main, pt. 2, Schlangen; 1898, p. 115; Wall, Mem. Asiat. Soc. Bengal, vol. 2, (8) 1909, p. 186, fig.; Roux, Abh. Senckenb. Ges. Frankfurt, vol. 23, 1910, pp. 223, 243; de Rooij, Reptiles of the Indo-Australian Archipelago 1917, pp. 217-218, fig. 83.

Platurus laticaudatus colubrinus: Peters and Doria, Ann. Mus. Civ. Genova, vol. 13, 1878, p. 412.

Laticauda colubrina: Stejneger, U. S. Nat. Mus. Bull. No. 58, 1907, p. 406; Longman, Mem. Queensland Mus., vol. 6, 1918, p. 41; Wall, Ophidia Taprobanica or the snakes of Ceylon, 1921, p. 431-434, fig. 82; Taylor, Snakes of the Philippine Islands 1922, p. 231; M. Smith, Monograph on the sea-snakes (Hydrophiidae) 1926, pp. 6-10; Smedley and Kloss, Journ. Malay Br. Roy. Asiat. Soc. vol. 4, 1926, p. 1963; M. Smith, Bull. Raffles Mus. No. 3, 1930, p. 71; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3 Serpentes, 1947, pp. 443-444, text figs. 141-142; Brongersma, Zool. Meded., no. 27, 1947, p. 308 (Pulu Bagan, Penang) Malaya; Tweedie, Snakes of Malaya 1954, pp. 102-103, pl. 9, text. fig. 24.

Platurus fasciatus colubrinus: Fischer, Abh. Naturw. Ver. Hamburg, vol. 3, 1856, p. 30.

Laticauda scutata Cantor, Journ. Asiat. Soc. Bengal, vol. 16, pt. 2, 1847, p. 125 (not of Laurenti).

Platurus scutatus: Günther, Reptiles of British India, 1864, p. 356.

Platurus frontalis De Vis, Ann. Queensland Mus., 1905, p. 48 (type-locality Brisbane, Australia).

Diagnosis: Large snakes, grayish above, yellowish below, with black bands, some, or all of which may be incomplete. Body of nearly uniform diameter throughout; prefrontals usually separated by a single scale; scalerows, 21-23 (rarely 25); a double series of elongated scales, the inner series the larger, bordering oral margin following second infralabial. Ventrals widened.

Description of species (EHT-HMS No. M 217 from near Singapore): Body subcylindrical, only slightly compressed. Rostral higher than broad, with a small tonguelike projection below, touching two supralabials, two nasals and two internasals; an azygous shield separating prefrontals; nostril lateral in lower part of undivided nasal; frontal very large, nearly twice as long as its distance from tip to snout, a little longer and with as large an area as a parietal; a somewhat enlarged median scale following parietals,

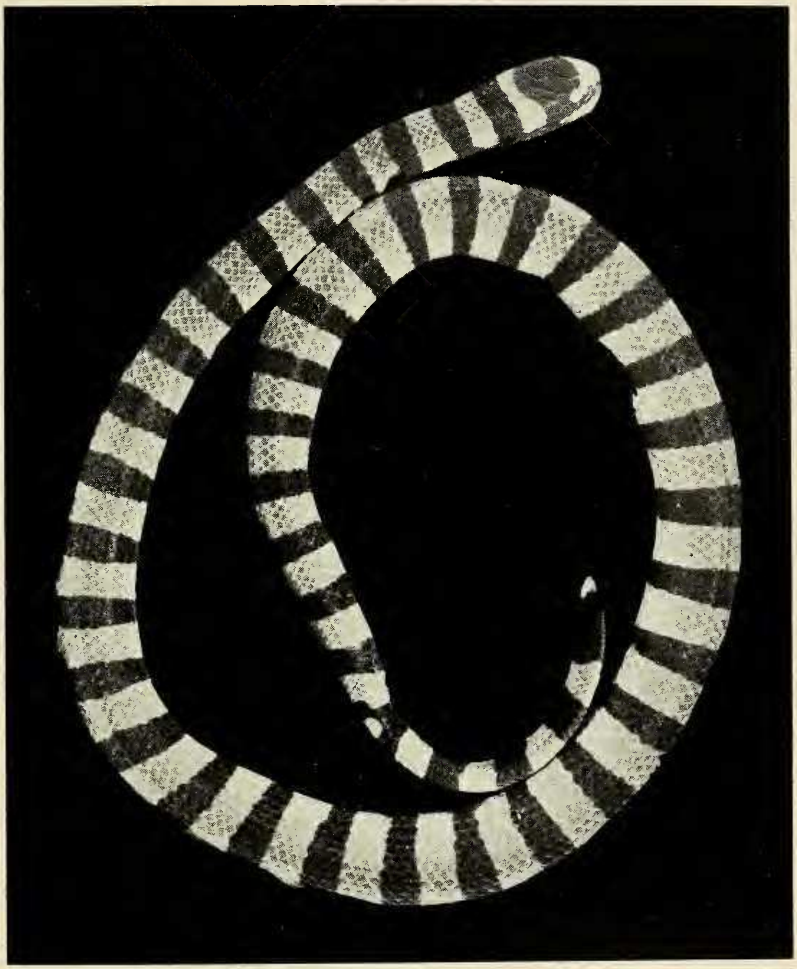

FIG. 98. *Laticauda colubrina* (Schneider). EHT-HMS No. M 217♀, Pulao Biola, near Singapore, J. R. Hendrickson coll. Actual total length, 444 mm.; tail, 54 mm.

which is one of three postparietals between temporals; one preocular, two postoculars; supralabials seven, the third and fourth bordering orbit; temporals, 1 + 2 + 3; infralabials, eight or nine, small, first five border two pairs of chinshields, both of which are well developed, anterior smaller, both pairs in contact with each other; a small azygous scale between anterior pair and first pair of infralabials; a double series of scales on lower oral border posterior to second infralabial, the result of a horizontal segmentation of the scales.

Scalerows: 23 on neck, 23 at middle of body, the scales smooth and imbricate throughout. Ventrals, 243, last, preceding vent, divided, others single, four times as broad as long; anal, divided; subcaudals, 45, paired.

Color in life: Light or dark bluish-gray above, yellowish below with black bands of more or less uniform width throughout, or narrowing on venter, none interrupted below; snout yellow, color extending backwards on each side of head above eyes as far as temporal shields, and along upper lip, leaving a dark bar between. Remainder of head black, color joining with first band crossing occiput, and this frequently connected with two following bands on underside of neck, but leaving a median ventral yellow patch connecting with first light band.

Measurements in mm.: Total length, 444; tail, 54.

Variation: The azygous scale, normally present between the prefrontals, is occasionally absent throughout its range. The most extraordinary variation is in the number of black bands. These vary from 24 (New Caledonia) to 64 in the Philippines. Occasionally a lateral ventral keel occurs, sometimes a median ventral keel on the posterior part of the body. These variations may represent subspecies. Ventrals vary from 213 to 246; The subcaudals in females from 37 to 47; in males, from 27-35.

Distribution: A rare snake in Thailand waters. A single specimen in the Hamburg Museum from "Siam" is, I believe, the only one recorded.

It is widely distributed, elsewhere being known from southern Malaya, Singapore, Calcutta, the Andaman and Nicobar Islands. It also occurs on islands of the South Pacific, coasts of Australia, but is presumably lacking in certain of the islands of the Archipelago. It reaches as far as the Fiji Islands, the Caroline Islands and New Zealand.

It is possible that colonies may be discovered about some of the coastal islands on the east or west coasts of Thailand.

Laticauda laticaudata (Linnaeus)

Coluber laticaudatus Linnaeus, Systema naturae, 10th Ed. 1758, p. 222 (type-locality, India); Andersson, Bihang Sven. Vet. Akad. Handl., 24 pt. 4, 1899, p. 18.

Platurus laticaudatus: Girard, Herpetology of the U. S. exploring expedition, 1858, p. 180; Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed. vol. 3, 1896, pp. 307-308; Boettger, Katalog der Reptilien-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main. Teil II, Schlangen, 1898, p. 114; Wall, Mem. Asiat. Soc. Bengal, vol. 2, (8), 1909, p. 185; de Rooij, Reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 217; Lord, Proc. Roy. Soc. Tasmania, 1918, p. 81.

Laticauda laticaudata: Stejneger, U. S. Nat. Mus. Bull. 58; (Herpetology of Japan) 1907, p. 402, fig.; Wall, Snakes of Ceylon, 1921, p. 427; Taylor, Snakes of the Philippine Islands, 1922, pp. 228-229.

Laticaudata l. laticaudata: Barbour, Mem. Mus. Comp. Zool. Harvard Col. vol. 44, 1912, p. 131; ? Peters and Doria, Ann, Mus. Civ. Genova, vol. 13, 1878, p. 412.

Laticauda scutata: Laurenti, Specimen medicum, exhibens synopsin reptilium emendatum 1768, p. 109 (substitute name for *laticaudatus.*).

Platurus colubrinus: Peters, Monatsb. Akad. Wiss. Berlin 1877, p. 418.

Platurus fasciatus Latreille, Histoire naturelle des reptiles, vol. 4, 1802 p. 185; Fischer, Abh. Naturw. Ver. Hamburg; vol. 3, 1856, pp. 28, 70; Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 493; Boulenger, Proc. Zool. Soc. London, 1887, p. 149.

Platurus laurenti: Rafinesque, Amer. Month. Mag., vol. 1, 1817, p. 432 (not of Daudin) a substitute name.

Coluber platycaudatus: Oken, Allgem. Naturg. vol. 8, 1836, p. 566.

Platurus fischeri: Jan, Rev. Mag. Zool., 1859, p. 149; Jan and Sordelli, Inconographie générale des Ophidiens, 1872, pt. 40, pl. 1, fig. 2, type (type-locality, "Océan des Grandes Indes"); Günther, The reptiles of British India, 1864, p. 356 (M. Smith believes the record incorrect); Anderson, Proc. Zool. Soc. London, 1871, p. 189; Fayrer, Thanatophidia of India, 1874, p. 24. Col. plate 18.

Platurus n. sp. F. Müller, Verh. Nat. Ges. Basel, vol. 10, 1892, p. 207.

?*Platurus muelleri* Boulenger Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 309 (type-locality, South Pacific; this is based on the preceding reference).

Diagnosis: A large species characterized by a light ground color with bands of gray, bluish gray, or ultramarine which tend to surround body. Head black with a curved yellow mark; no azygous prefrontal scale; upper lip dark brown.

The presence of this snake in Thai waters is problematical. It is known from the Bay of Bengal whose waters bound the western side of peninsular Thailand, and in waters south of Japan. This snake usually finds habitat in the neighborhood of small islands and utilizes them for breeding grounds or for the rearing of young. One island may have thousands and many other neighboring islands may have none. Careful exploration of small islands west of peninsular Thailand will probably disclose the presence of such colonies there. Günther reports it from the Gulf of Siam.

The extensive synonymy shows that the species has certain geographical variations that may warrant subspecific consideration (not impossibly specific).

Description of species (largely after Malcolm Smith [1926]): Body subcylindrical of nearly uniform diameter throughout. Rostral higher than wide; no azygous shield between internasals and prefrontals; frontal longer than its distance from end of snout, as long as parietals; one pre- and two postoculars; seven supralabials, third and fourth bordering orbit; temporals, 1 + 2; seven infralabials concealed largely by supralabials, four or five of which border first chinshields; two pairs of chinshields in contact, anterior pair the smaller; mental very small; often some tiny scales outside infralabials along oral border.

Scalerows: 19, 19, 17, scales smooth without pits; ventrals, 225-243, about four times as broad as long; anal, divided, subcaudals, 38-47 pairs in males, 30 to 35 in females. A median ventral keel sometimes present on posterior part of body.

Color: Bluish gray to ultramarine above, yellowish below with black bands of more or less uniform width throughout, some or all of which may be complete below. Head black with a curved yellow mark above, color often extending forwards to cover whole of snout and downwards behind eyes to reach lip. A median elongated patch of yellow on underside of jaw variable in width, usually connecting with first yellow ring on neck.

Measurements in mm.: Male, total length, 910; tail, 110. Female, 1070; tail, 110.

Variation: The number of black bands is variable in various populations. In the Japanese area the number of such bands is 39 to 55; in Java as few as 20; in the Sulu sea, as many as 66.

.*Distribution:* Widely distributed from the Riu Kius, Philippines to Australia, west through the Indo-Australian Archipelago to Java and Sumatra and the coast of Bengal.

Günther under the name of *Platurus fischeri* reports a specimen from the Gulf of Siam near Chartaboum (Chanthaburi). While Malcolm Smith states that this record "is probably incorrect," there is no specific reason for thinking so.

Aipysurus Lacépède

Aipysurus Lacépède, Ann. Mus. Paris, vol. 4, 1804, p. 197 (type of genus, *A. laevis*).

Aepyurus Agassiz, Nomenclator zoologi index, univ. 1846, p. Berg. Comm. Mus. Nac. Buenos Aires, vol. 1, (8) 1901, p. 289 (emendation or correction).

Maxillary bone extending forward beyond the palatine; poison-fangs followed after a diastema by from five to eleven teeth; head-shields complete or divided; nasals in contact, nostrils dorsal; scales imbricate, in 17 to 25 rows; ventrals widened, one-third to one-half times width of body. Body subcylindrical of nearly equal diameter throughout.

Seven or eight species are known, distributed from the southeastern Asiatic coasts to Australia and Oceania. One only has been taken in the Gulf of Siam.

Aipysurus eydouxii (Gray)

(Fig. 99)

Tomogaster eydouxii Gray, Catalogue of the snakes in the British Museum, 1849, p. 59 (type-locality, Indian Ocean).

Aipysurus eydouxii: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 304; A vertebrate fauna of the Malay Peninsula, . . . Reptilia and Batrachia, 1912, pp. 195-196; Wall, Mem. Asiat. Soc. Bengal, vol. 2 (8), 1909, p. 189; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 219, fig. 84; Malcolm Smith, Journ. Federated Malay States Mus., vol. 10, 1920, p. 34; Taylor, Snakes of the Philippine Islands, 1922, pp. 226-227; Bourret, Serpents marins Indochine Française, 1935, p. 20; Les serpents de l'Indochine, 1936, p. 343, fig.; M. Smith, Monograph on the sea-snakes (Hydrophiidae), 1926, pp. 14-16, fig. and Bull. Raffles Mus., no. 3, 1930, p. 71.

Aepyurus eydouxi: M. Smith, The fauna of British India, Ceylon and Burma, . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 445-446; Tweedie, The snakes of Malaya, 1954, pp. 103-104.

Thalassophis anguillaeformis Schmidt, Abh. Naturw. Ver. Hamburg. vol. 2, 1852, p. 76, Colored plate 1 (type-locality, Java).

Aipysurus anguillaeformis: Günther, Reptiles of British India, 1864, p. 357.

Thalassophis muraenaeformis Schmidt, Abh. Naturw. Ver. Hamburg, vol. 2, 1852, pp. 76-77, pl. 1; Boettger, Zool. Anz., 1892, p. 420.

Aipysurus margaritophorus Bleeker, Nat. Tydschr. Ned. Ind., vol. 16, 1858, p. 49 (type-locality, Java).

Aipysurus laevis: Guichenot, Voyage Pole Sud. Zool. vol. 3, 1853; Rept. p. 21, pl. 6; Duméril and Bibron and Duméril, Erpétologie Générale . . . vol. 7, 1854, p. 1326, Atlas. pl. 77 bis; Fischer, Abh. Naturw. Ver. Hamburg, vol. 3, 1856, p. 32; Jan and Sordelli, Icongraphie générale des ophidiens, 1872, pt. 40, pl. 2, Sauvage, Bull. Soc. Philom, 1877, p. 112.

Diagnosis: A sea-snake, usually little more than half a meter in length; poison-fangs followed by 10 to 13 small maxillary teeth; two, sometimes four, prefrontals; two anterior temporals; second supralabial not touching prefrontal; scales in 17 rows, smooth imbricate. Low ventral count, 129-144, each with a median keel; and each one third to one half of the width of the body.

Description of species (from C.U. No. 2684): Body compressed the diameter at widest point more than double the diameter of head; ten to eleven small maxillary teeth follow behind poison-fangs; diameter of eye greater than its distance from mouth; frontal large, longer than its distance from end of snout; two prefrontals; one

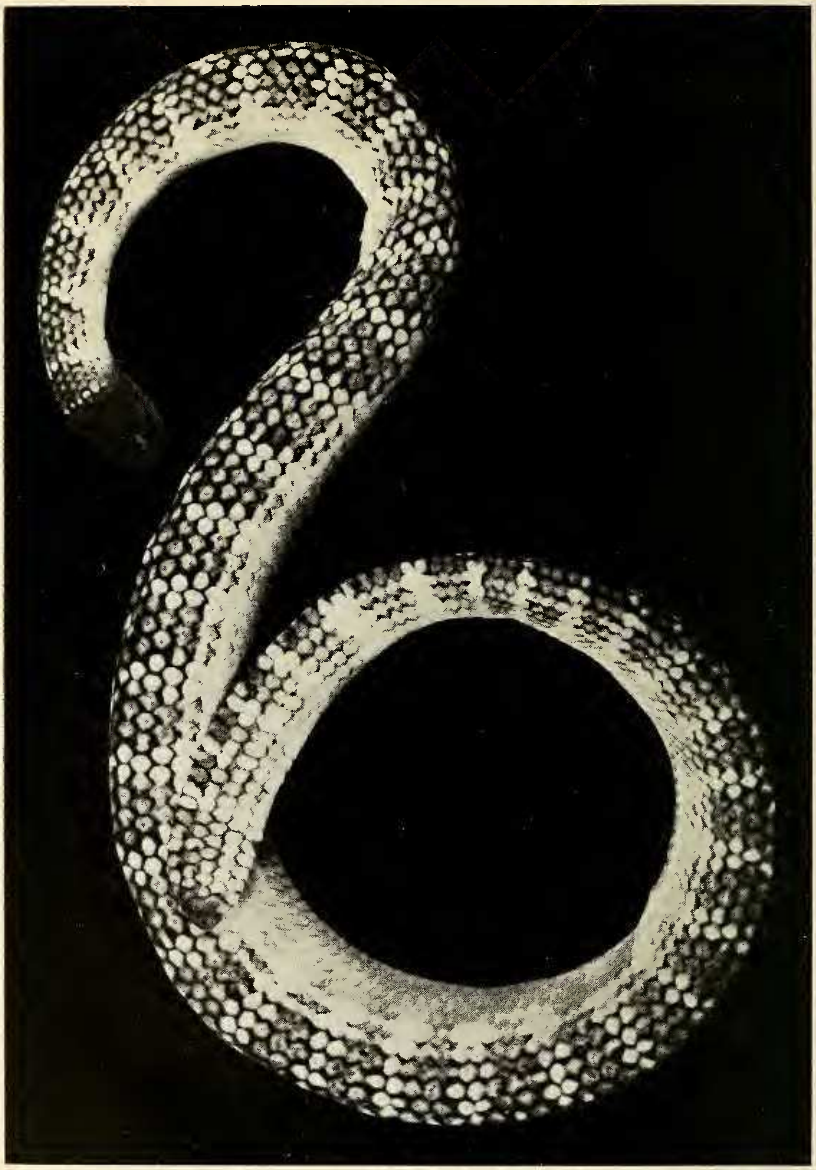

FIG. 99. *Aipysurus eydouxi* (Gray). C.U. No. 2684, Gulf of Siam. Actual total length, 660 mm.; tail, 100 mm.

large preocular, two large postoculars; two anterior temporals; supralabials, six, second slightly in contact with prefrontal, fourth borders orbit, sixth longest; infralabials six, first four in contact with chinshields, first pair very large, in contact with one another behind mental, as large as first chinshields; latter slightly shorter than second pair which is separated by small scales.

Scalerows: 17 on neck and body, 15 before vent, all imbricate and entirely smooth; ventrals, 144 each with a distinct tubercle, the last one divided; anal, divided; subcaudals, 32, single, last subcaudal a vertically compressed plate.

Color: Brownish or olive above with 39 cross-bands of yellow black-edged scales, often broken up on vertebral line, and occasionally alternating on the two sides; these bands widen towards venter, which is yellow. Head in adults, dark olive, blackish in young, the black extending on neck. On occiput a row of seven ocellated spots.

Measurements in mm.: Total length, 660; tail length, 100 (specimen from Hua Hin, Chon Buri).

Variation: The squamation of the head is usually very constant except the above mentioned division of the prefrontals, while the keeling on ventral scales may be poorly or strongly developed, or anteriorly the keels may termiate in a strong spine. Rarely the bands are continued across the venter. A specimen from the Gulf of Siam had a rich slate-blue iridescence in life. The largest known specimen measured 910 mm. Ventrals vary between 129 and 144, the subcaudals from 23-32. The number of bands varies from 44 to 55, on body and tail.

Distribution: The species is known from the northern part of the Gulf of Siam (Bight of Bangkok). Intensive collecting at Songkhla yielded no specimens.

This species one of the most widely distributed serpents, is known along the coasts of Cochin China and Viet Nam, and through the Indo-Australian Archipelago to the Philippines and to Queensland in Australia.

Subfamily HYDROPHIINAE Boulenger

Hydrophiinae Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 393.

This subfamily comprises all but two of the genera of the sea-snakes the exceptions being (*Laticauda* and *Aipysurus*). All of these are marine species with the exception of *Hydrophis semperi* (Lake Taal, Philippines) and perhaps one *Hydrophis* in the Sea of Singgora in Nakhon Si Thammarat, a body of water that in its northern end is practically fresh, while in the southern part the water is almost typically marine.

While the members of the genus *Laticauda* spend considerable time out of the water on land, none of the Hydrophiinae can survive more than a few days at most, and snakes tossed high on shore or left by a receding tide are likely to die before the return of the tide, if exposed to sun-heat. Ordinarily they cannot crawl the few meters necessary for a return to the water; however aimless flopping about could accidentally accomplish the return.

All the Hydrophiinae are ovoviviparous, the young being born in the water. There are reports that certain of the Laticaudinae are oviparous.

KEY TO THAI GENERA OF THE HYDROPHIINAE

1. Not more than 23 scalerows around middle of body; ventrals distinct, undivided. Head shields regular; no distinct diastema follows poison-fangs; body of nearly equal diameter throughout; snout somewhat pointed .... *Kerilia*

More than 25 scalerows around body at thickest part 2

2. Scalerows about thickest part of body, 75 to 93, small irregular; ventrals, 320 to 368; a pair of internasals .... *Kolpophis*

Fewer than 70, but more than 23 scalerows about thickest part of body ... 3

3. Head-shields normally regular and entire 4

Head-shields especially frontals and parietals breaking up into small scales 6

4. Ventrals relatively broad anteriorly on body, narrowed posteriorly; mental shield normal; five maxillary teeth behind fangs .... *Praescutata*

Ventrals present (rarely absent), small, uniform throughout 5

5. Three to five maxillary teeth behind fangs; mental slender, elongate, at least partly concealed in mental groove .... *Enhydrina*

One to eighteen maxillary teeth behind fangs; mental normal, not concealed. Head large or small .... *Hydrophis*

6. A pair of internasals present, separating nasals 7

No internasals separating nasals 8

7. Five to seven maxillary teeth behind fangs; scales subimbricate; ocular scales and nasal with somewhat spinous edges .... *Acalyptophis*

Five maxillary teeth follow poison-fangs; no spinous elevations on edges of ocular or other head scales .... *Thalassophis*

8. Head very small, anterior third of body very slender; ventrals divided by a fissure; scales juxtaposed; five or six maxillary teeth follow fangs, *Microcephalophis*

Head not small; anterior part of body not proportionally slender 9

9. Eight to ten maxillary teeth behind poison-fangs; body greatly compressed; ventrals with a median groove. Scales subquadrangular, juxtaposed .... *Pelamis*

Fewer than eight maxillary teeth behind poison-fangs; body not greatly compressed 10

10. Large snakes of large girth; scales on dorsum somewhat pointed behind, strongly imbricate; ventrals with a median groove; six or seven maxillary teeth behind poison-fangs .... *Astrotia*

Smaller snakes (less than one meter), the scales on dorsum subquadrangular, juxtaposed; three to six maxillary teeth behind poison-fangs, *Lapemis*

Genus KERILIA Gray

Kerilia Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 57 (type of genus, *jerdoni*); M. Smith, Monograph of the sea-snakes (Hydrophiidae) 27, Nov. 1926, p. 31; The Fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 446.

Hydrophis Günther, Reptiles of British India, 1864, p. 360 (*part.*).

Distira Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 285 (*part.*).

Diagnosis: Maxillary bone longer than ectopterygoid, extending forwards beyond palatine; poison-fangs moderate, followed practically without a diastema, by from seven to nine smaller teeth; snout narrowed anteriorly and sloping downwards; nasals in contact, nostrils dorsal; scales relatively large, imbricate, in regular rows, strongly keeled; ventrals about as wide as adjoining scales, usually with two keels; head-scutes complete, not fragmented; usually a preocular; one postocular.

Only a single species is recognized, with two subspecies, one of which is known in Thailand, and the other may very probably occur.

Kerilia jerdonii Gray

Kerilia jerdonii Gray, Catalogue of the snakes in the collections of the British Museum, 1849, p. 57 (type-locality Madras, India); Wall, Ophidia Taprobanica, or the snakes of Ceylon, 1921, pp. 386-390, fig. 73; Smith, Bull. Raffles Mus., no. 3, 1930, pp. 71-72; Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 31-32, fig. 15; The Fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes 1943, pp. 446-447, fig. 143.

Hydrophis jerdonii: Günther, Reptiles of British India, 1864, p. 362, pl. 25, fig. B; Anderson, Proc. Zool. Soc. London, 1871, p. 190; Fayrer, Thanatophidia of India, 1874, pl. 20; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia; 1912, p. 186; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 232; Smith, Journ. Federated Malay States Mus., vol. 10, 1920, pp. 28-29.

Distira jerdonii: Boulenger, Fauna of British India, Ceylon and Burma, Reptilia and Batrachia; 1890, p. 408; Boettger, Mitth. Geogr. Ges. Nat. Mus. Bremen., ser. 2, vol. 5, 1893 (not seen); Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 299; Sclater, List of the snakes in the Indian Museum, 1891, p. 65; Wall, Mem. Asiat. Soc. Bengal, 1906, p. 293, vol. 2, (8), 1909, p. 241, fig.

Hydrus nigrocinctus: Cantor, Cat. Mal. Rept., 1847, p. 129, pl. 40, fig. 8.

Hydrus cantori Jerdon, Journ. Asiat. Soc. Bengal, vol. 22, 1854, p. 526.

KEY TO SUBSPECIES OF KERILIA JERDONI GRAY

19-21 scalerows around middle of body; 30 to 38 black dorsal bars; three infralabials touch first chinshields . . . . *jerdonii jerdonii*

21-23 scalerows around middle of body; 38 to 61 black bars on body; three (rarely four) infralabials touch first chinshields; first temporal and sixth supralabial frequently joined (approximately 50%), *jerdonii siamensis*

It is possible that *K. jerdonii jerdonii* will be found on the west coast of peninsular Thailand since it has been reported at Penang. The other subspecies, *K. jerdonii siamensis* is one of the more common sea-snakes in the lower part of the gulf of Siam.

Kerilia jerdonii siamensis M. Smith

(Fig. 100)

Kerilia jerdonii Gray, Catalogue of the snakes in the British Museum, 1849, p. 57 (type-locality, Madras, India).

Distira jerdonii: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., 1896, vol. 3, p. 299 (*part.*).

Kerilia jerdoni siamensis M. Smith, Monograph on the sea-snakes (Hydrophiidae), 1926, p. 32 (type-locality, Pattani Bay, Thailand).

Hydrophis jerdoni: de Rooij, Reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 232; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1920, pp. 28-29, 57.

Diagnosis: Characters of the genus: this differs from the Indian form occurring in the Bay of Bengal in having more dorsal bars (34 to 50) on body (mean, 46).

Description of subspecies (from No. 693, Songkhla, at mouth of Singgora Sea): Head scarcely distinct from neck; rostral as wide as high, largely visible above, pointed behind; nasals a little longer than wide, broadly in contact; nostril dorsal, in outer posterior part of nasal scale; prefrontals about half area of nasals; frontal longer than wide, shorter than its distance from end of snout, shorter than parietals, wider than supraoculars; parietals about twice as long as wide; a small preocular; one postocular; one anterior temporal fused with sixth labial; supralabials, 6-6, third and fourth broadly bordering orbit, first smallest; seven infralabials, first three only border first pair of chinshields, which are equal or somewhat larger than second pair; eye small, its greatest diameter less than its distance from mouth, equal to its distance from nostril; scales in regular rows, strongly keeled except on neck.

Scale-formula: 17, 21, 21, the scales broader than long, imbricating; ventrals, 240; anals, 4; subcaudals, 34; ventrals usually wider than adjoining scales, frequently smaller or divided; when keels are present on ventrals there are usually two.

Color in life: Blue-gray to ultramarine on eight or ten dorsal scalerows; laterally and ventrally yellowish; a series of 39 black bands on body, 4 + on tail; bands widened dorsally, narrowing on sides, not crossing venter (occasionally vaguely indicated on venter). Top of head clouded with bluish gray; chin-scales dirty brownish-white.

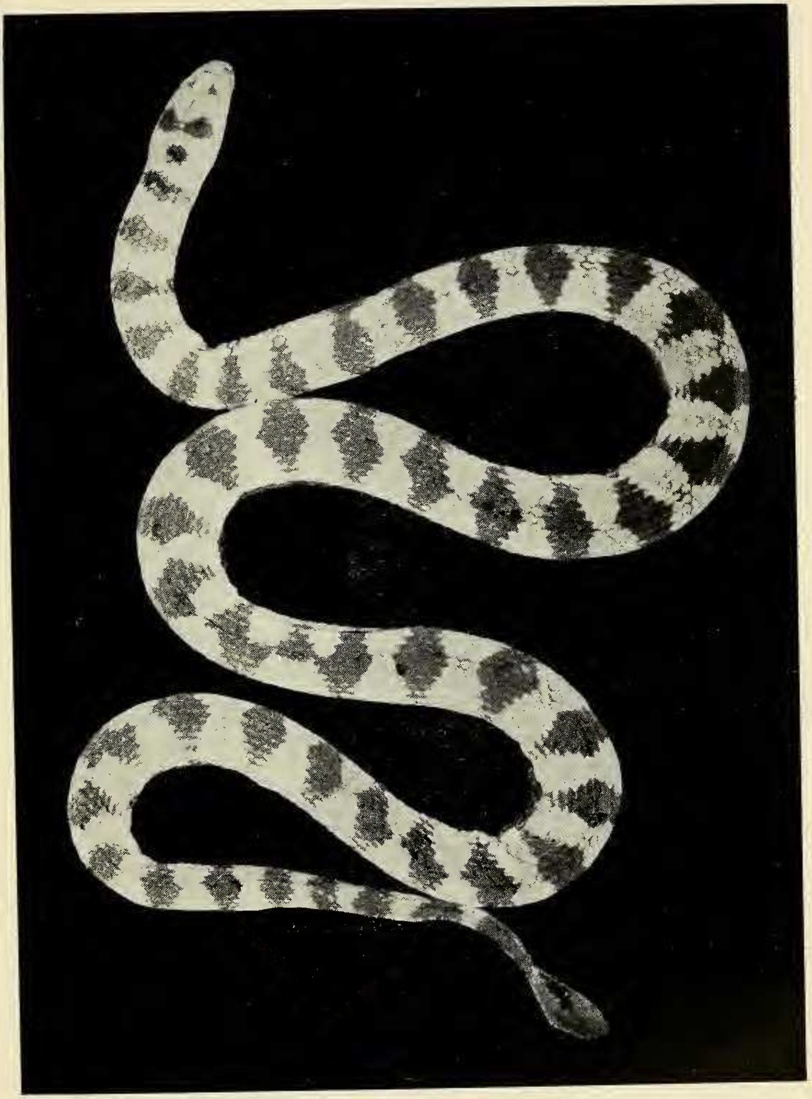

FIG. 100. *Kerilia jerdonii, siamensis* M. Smith. No. 34610, Songkhla, Songkhla province, southern Thailand. Actual total length, 455 mm.

Measurements in mm.: Total length, 938; tail, 87; head-width, 18.2; head-length, 25.

Variation: Dr. Malcolm Smith has designated the form of *Kerilia* found in the Gulf of Siam as, *Kerilia jerdonii siamensis* on the basis of a series of specimens taken at Songkhla and Pattani.

My series of specimens from Songkhla was able to confirm his findings as regards the increased number of bands about body and tail. The number of the infralabials touching the first chinshields was three in 39 cases (considering the two sides); four cases where there were only two, and only a single case where four were in contact. Only a single specimen was found with 23 scales about the body; all the others had the formula 17 (18), 21 (20), 21.

There was one character that appeared frequently in the series. Considering again the 22 specimens (44 cases), the first temporal was fused with the sixth labial in 24 cases, separate in 20. There was a tendency for the preocular to fuse with the prefrontal; in four specimens it was fused on both sides, in three others on one side only, while it was separated in the remainder.

The counts of the number of bands on body and tail resulted in a spread from 38 to 61 (mean, 46). The specimen having 38 bands was otherwise seemingly within the variable limits for other characters of the species; that with 61 bands also had a larger number of ventral and subcaudals than the average (284). Only one higher count was found, (293) with 45 bands. Ventral counts in the Songkhla series was from 224 to 254 (the mean, 235), the subcaudal count from 30-43. In one specimen the bars are joined together on the back, while in another they form a zig-zag line.

Remarks: The food, at least in the younger specimens, consists chiefly of slender eels.

Distribution: Gulf of Siam. As yet known there only at Pattani and Songkhla.

Genus *Astrotia* Fischer

Astrotia Fischer, Abh. Naturw. Ver. Hamburg, vol. 3, 1856, p. 38 (type of genus, *schizopholis*).

Diagnosis: Large snakes. Maxillary bone longer than lower aspect of ectopterygoid, not reaching forward as far as palatine which is curved outwards. Poison-fangs followed by a diastema and then six or seven smaller teeth. Shields on head large, usually regular; nostrals directed upwards; nasals in contact; scalerows 47-59 on body; most ventrals divided into two parts. Body scales strongly imbricate.

Only a single species is recognized. It was described twice in 1846, by Gray as *Hydrus stokesii* from the Australian Seas, and by Schmidt (1846), as *Hydrophis schizopholis* from the China Sea. Two other forms described have been placed in synonomy by

Data on *Kerilia jerdonii siamensis*

NUMBER	478	193	476	325	34601	337	672	552	571	336	282	477	555
Total length	960	938	850	411	446	490	524	433	433	418	419	405	390
Tail	106	87	93	49	49	47.6	60.5	48	42	48	41	39	39
Head-width	20	18.2	15	9	9	10	......	9.6	9	9.2	9.2	9.5	9.2
Head-length	29.5	25	21.5	13.2	13	15.7	17	15	14.4	14.6	15	16	14.6
Ventrals	231	229	232	224	238	225	234	242	256	241	225	235	245
Subcaudals	38	34	39	40	38	33	32	42	39	43	30	33	36
Scalerows, neck	17	17	17	17	17	17	18	17	17	19	17	17	18
Scalerows, middle	21	21	21	21	21	21	21	21	21	23	21	21	21
Scalerows at vent	21	20	21	21	21	21	21	21	21	23	20	21	21
Preoculars	1	1	1	1	1	1–0	0–0	1–1	1–1	1–1	0–0	1–1	1–1
Postoculars	1	1	1	1	1	1–1	1–1	1–1	1–1	1–1	1–1	1–1	1–1
Supralabials	6–6	6–6	6–6	6–6	6–6	6–6	6–6	6–6	6–6	6–6	6–6	6–6	6–6
Labials enter orbit	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2
Infralabials	6–6	6–6	7–7	7–7	7–7	7–7	7–7	7–7	7–7	7–8	6–6	7–7	7–7
Labials border chinshields	3	3	3	3	3	3–3	3	3	3	3	2–2	3–3	3–3
Body bands	41	41	42	39	39	43	39	55	41	38	43	42	48
Tail bands	5	3+	4	4+	5+	4+	5+	6+	4+	5+	4+	4+	5+

Malcolm Smith, the types of both having been lost. I am not certain that Gray's name actually antedates that of Schmidt. M. Smith the most important reviser of the group has chosen the name proposed by Gray.

A remarkable report on the breeding of this species is quoted by M. Smith, (*loc. cit.*, 1943, p. 440).

Astrotia stokesii (Gray)

(Fig. 101)

Hydrus major (*part.*) Shaw, General zoology, vol. 3, 1802, p. 558.

Hydrus stokesii Gray, in Stokes, Discovery of Australia, vol. 1, 1846, p. 502, pl. 3 (type-locality, "Australian Seas").

Hydrophis stokesii: Günther, Reptiles of British India, 1864, p. 363; Peters and Doria, Ann. Mus. Civ. Genova, vol. 13, 1878, p. 415; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 183-184.

Distira stokesii: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 408; Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, pp. 288-289.

Astrotia stokesii: Wall, Mem. Asiat. Soc. Bengal, vol. 2, 1909, p. 250; Ophidia Taprobanica or the snakes of Ceylon, 1921, pp. 396-400, fig. 75; M. Smith, Monograph of the sea-snakes (Hydrophiidae), Nov. 27, 1926, pp. 113-115; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 440, 471-472 ("Mekran coast, Colombo, Ceylon; Bay of Patani on the east coast of the Malay Peninsula; Singapore; and the north coast of Australia").

Hydrus annulatus Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 59 (type-locality, Singapore).

Hydrophis schizopholis Schmidt, Abh. Naturw. Ver. Hamburg, vol. 3, 1846, pp. 166, col. pl. 15 (type-locality, "China Sea").

Astrotia schizopholis: Fisher, Abh. Naturw. Ver. Hamburg, vol. 3, 1856, p. 38; Jan and Sordelli, Iconographie générale des Ophidiens, pt. 39, 1872, pl. 3.

? *Hydrophis granosa* Anderson, Proc. Zool. Soc. London, 1871, p. 100 (type-locality, Indian coast).

Hydrophis guttata Murray, Journ. Bombay Nat. Hist. Soc., vol. 2, 1887, p. 34 (type-locality, Mekran coast).

Diagnosis: Head scales large, regular; body proportionally very stout; 37-47 scalerows on neck; 47-59 scalerows on body; scales imbricate, pointed, keeled, or tuberculate; ventrals, 226-286, a few anterior ones entire, others divided; preanals strongly enlarged. Body with bands and ventral spots.

Description of species (from No. 34335 ♂, Ang Hin, Chon Buri): Rostral small, a little broader than high, well visible above; nasals broadly in contact on median line, scales partly divided by sutures from nostril to second labial (on right side completely severed); prefrontals small, a little wider than long, their common suture considerably less than their length; frontal relatively small, longer than wide, much shorter than its distance from tip of snout, much shorter than parietals; latter tending to break up into smaller scales

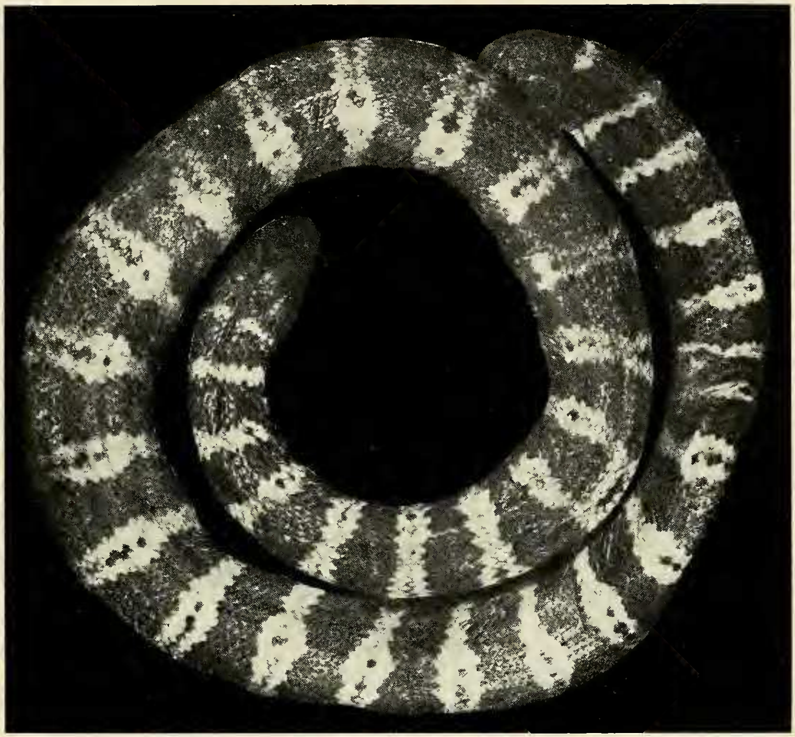

FIG. 101. *Astrotia stokesii* (Gray). No. 34335, Ang Hin, Chon Buri, southeastern Thailand. Actual total length, 1215 mm.; tail 175 mm.

posteriorly; a preocular; two postoculars; supraoculars narrower than frontal; a large upper anterior temporal and a smaller lower one, both touching postoculars; lower scale followed by two other temporals, the arrangement being, $\frac{1}{3}$; eight supralabials, second largest, third, fourth, and fifth bordering orbit; last three small (suggesting that last three labials had been divided and upper parts were now temporals); infralabials eleven; chinshields small, scarcely differentiated; first infralabials elongate, broadly in contact behind small anteriorly emarginate mental; two or three enlarged scales bordering posterior infralabials.

Scalerows: 36 on occiput; 32 on neck, 44 at middle of body; 36 before vent; 24 at broadest part of tail; the scales all strongly imbricate. Anterior ventrals enlarged somewhat; about 12 scales between mental and first ventral; first 16 ventrals single, other 217 divided (total count 233); about 43 subcaudals; a pair of enlarged anals; other anal scales only slightly enlarged. All scales keeled, the keels shorter on venter than on dorsum.

Color: Head brownish black, nearly uniform, the color extending four or five scalerows behind parietals. Body gray-black with a series of 29 cream bands, each varying from two to six scales in width, all except first passing entirely around body; cream bands with a few more or less scattered black scales; five complete narrower cream bands on tail, one incomplete. Anal scales whitish.

Measurements in mm.: Total length, 1215; tail, 175; width of head, 36; length of head, 50; depth of body, 62.

Variation: Many of the scales have the keel divided into two or three tubercular elevations; scales on occiput and anterior part of neck smooth; two or three anterior temporals; eight to ten supralabials; ten to twelve infralabials.

Scalerows on the neck vary between 37 and 47; on body, between 47 and 59. Ventrals vary between 226 and 286, the divided ventrals with bifid or bidentate tips. The head may be dark olivaceous or somewhat yellowish.

The number of bands varies from 32 to 36 and these are usually retained throughout life. The largest specimen reported, a female, reaches a length of 1600 mm.; the tail, 190 mm.

Distribution: In Thailand the species has been taken near Ang Hin, Chonburi, and the Bay of Pattani, Gulf of Siam. It is known from Singapore, Ceylon, Malaya and the northern coast of Australia.

Remarks: This is the largest sea serpent in girth and perhaps in weight. The type measures 260 mm. about middle of body. The specimen described is from a fish trap near Ang Hin, Chon Buri Thailand.

Genus *Kolpophis* Smith

Kolpophis Smith, Monograph of the sea-snakes (Hydrophiidae), Nov. 27, 1926, p. 106 (type of genus, *annandalei*).

"Maxillary bone longer than the lower aspect of the ectopterygoid, not extending forwards as far as the palatine; poison-fangs followed after an interval by six or seven teeth; nostrils superior; head-shields irregularly divided. Head large, body stout, covered with small, irregular, juxtaposed scales; ventrals small but distinct throughout."

Only a single species is recognized, *Kolpophis annandalei* (Laidlaw).

Kolpophis annandalei (Laidlaw)

(Fig. 102)

Disteira annandalei Laidlaw, Proc. Zool. Soc. London, 1901, p. 579, pl. 35 (type-locality, Pattani Bay).

Thalassophis annandalei: Boulenger, Fasciculi Malayenses, Zoology, vol. 1, 1903, p. 16; Wall, Mem. Asiat. Soc. Bengal, vol. 2, 1909, p. 245; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 195; Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, 1915, p. 214; de Rooij, Reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 223-224, fig. 87 (head scales); Smith, Journ. Federated Malay States Mus., vol. 10, 1920, pp. 29-30, 59.

Kolpophis annandalei: Smith, Monograph of the Sea Snakes, 1926, pp. 106-107, fig. 3; Smith, Bull. Raffles Mus., no. 3, 1930, pp. 83-84; Bourret, Serpents Marins Indochine Franç., 1935, p. 55; M. Smith, The Fauna of British India, Ceylon and Burma, Reptilia and Amphibia, vol. 3, Serpentes, Dec. 1943, pp. 467-468; Tweedie, the snakes of Malaya, 1954, p. 111.

Diagnosis: A sea snake, with head rather large; body short and stout, the greatest diameter of body usually less than twice diameter of neck. Scales very small, non-imbricating, 74-93 around widest part of body; ventrals small distinct. Head scales tend to break into smaller scales; parietals separated by small scales; 35-45 gray dorsal rhombs or bars, much broader than the interspaces between them.

Description of species (from No. 34633, Songkhla): Rostral somewhat quadrangular, not fragmented, visible above as a transverse line; this bordered behind by a pair of large anterior nasals extending posteriorly between much smaller posterior nasals, in which nostril is pierced; two internasals, left one fused to anterior nasal; prefrontals touching posterior nasal, preocular, and one loreal; frontal partly broken into small scales; small scales separate parietals, which are likewise partly fragmented; supraoculars large, nearly as wide as frontal; on right side four large anterior labials, fourth entering eye; remainder of labials fragmented leaving a row of six small scales along lip; three suboculars entering orbit; temporals 3 + 5 + 5; one preocular and two postoculars; on left side only first and third supralabials unfragmented, with a total of eleven scales bordering lip; three or four loreals, three suboculars, one preocular, and two postoculars; diameter of eye equal or slightly less than its distance from mouth. Mental small with a pair of small latero-anterior horns; first pair of chinshields scarcely differentiated; second not differentiated; infralabials fragmented except first three pairs; 15-17 scales border lower lip; diameter of eye greater than its distance from mouth.

Scales small, juxtaposed, not or slightly tuberculate; body compressed, especially so posteriorly. Scales in 63 rows about occiput, 76 on neck, 96 at widest part of body, 48 in front of vent; 15 scales

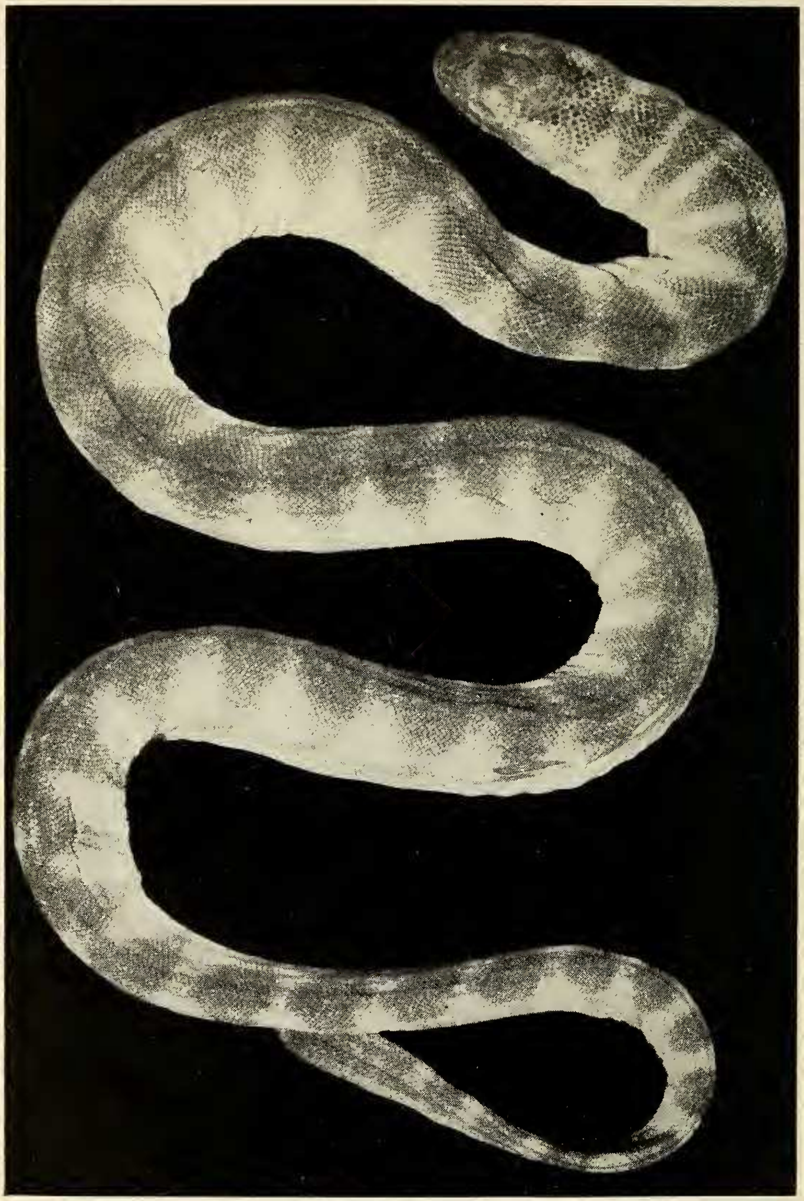

FIG. 102. *Kolpophis annandalei* (Laidlaw). No. 34633, Songkhla, Songkhla province, Thailand. Actual total length, 480 mm.; tail, 54 mm.

between chinshields and first ventral; ventrals 286; subcaudals, 76; a pair of enlarged lateral anal scales; between these and last complete ventral, several pairs of widened ventrals, terminal one widest and bordered by one or two small lateral scales; ventrals usually enlarged throughout but occasionally a few of these scales divided. Maxillary with two enlarged grooved fangs, followed after a long diastema by five subequal teeth.

Color in life: Above yellowish olive with a series of gray-olive rhombs, bands, or saddles, incomplete below, much wider than interspaces, and narrowing laterally, 40 on body, six on tail; tip of tail blackish-olive; venter whitish or cream; head variegated dark gray or dark olive with lighter clouded areas behind eyes.

Table of measurements and data on *Kolpophis annandalei*

NUMBER	34632	34633	34631	34634
Sex	♂	♂	♂	♀
Total length	454	480	534	643
Tail	59	54	65	80
Head-width	14.5	14.2	16	16.5
Head-length	27	26	28	31
Scalerows, neck	76	65	73	75
Scalerows, widest part	96	79	86	85
Scalerows before vent	48	58	58	56
Dorsal rhombs	40	47	45	45
Tail rhombs	6	7	7	7
Ventrals	386	346	394	380
Subcaudals	76	65	81	76

* Nos. 34631-34634, Songkhla.

Variation: The species reaches a known length of 910 mm ♂. The number of dark rhombs on body varies between 35 and 47 in number; the ventrals vary between 320 and 403. Scalerows on the neck vary between 62 and 68, and those around the body between 74 and 96. There are 15 to 20 scales between the first chinshields and the first widened ventral.

Three of my specimens have the very small posterior nasal scale completely separated from the anterior by a separate pair of internasals situated behind the elongated anterior nasals. Most of the labials are fragmented, leaving one or more "suboculars" and from one to four "loreal" scales.

The number of "supralabials" (scales bordering the upper lip) varies from 9 to 13, the infralabials, 9 to 14. In all four specimens listed, one to four of the labials may remain unbroken. One specimen has the nostril opening between the two nasals that are partially fused together. The individual scales may be smooth or they may have a short keel or tubercle.

A series of specimens from Pattani Bay differs somewhat in the number of scalerows and ventrals from a series from the Singgora Sea at Songkhla. The counts are as follows: (Songkhla) Females: scales about neck, 65; scales about widest part of body, 79; ventrals, 346; six males: scales, 75 to 87, ventrals average 380; (Pattani), females: scales, 76 to 90, ventrals, 346 average; males, 70 to 84, 355 average. The samples, however, are too small for the differences to be signifiicant.

The rhombs on the back tend to become less distinct with age, and the back may be uniform gray.

Distribution: In Thailand specimens have been taken in the Gulf of Siam, chiefly along the coasts of Pattani, and Songkhla and in the Singgora Sea. Elsewhere it occurs along the coasts of Cambodia and Viet Nam.

Genus *Praescutata* Wall

Praescutata Wall, The snakes of Ceylon, 1921, p. 390 (type of genus, *viperina*).

Thalassophina M. Smith, Monograph of the sea-snakes (Hydrophiidae), Nov. 27, 1926, p. 33 (type, *viperina*).

Diagnosis: Nostrils on dorsal surface of snout; nasal scutes in broad contact with each other; head-scutes complete, large, regular; body moderately elongate; ventrals widened on anterior part of body, much narrowed on posterior part of body; dorsal scales about body 37-50 very slightly imbricating anteriorly, farther back, juxtaposed; on upper part of tail, scales imbricating, all keeled or tuberculate, and usually hexagonal in shape. Maxillary bone not reaching as far forward as the palatine; latter curves outward; poison-fangs followed, after a diastema, by five maxillary teeth; parietals broad, with a pair of pointed lateral prongs.

Praescutata viperina (Schmidt)

(Fig. 103)

Thalassophis viperina Schmidt, Abh. Naturw. Ver Hamburg, vol. 2, 1852, pt. 2, p. 79, pl. 3 (type-locality, Java); M. Smith, Monograph of the sea-snakes (Hydrophiidae), Nov. 27, 1926, pp. 33-34, fig.; Pope, The reptiles of China, 1935, p. 356; Bourret, Serpents marins Indochine Française, vol. 1, 1935, p. 28; Les serpents de l'Indochine, 1936, p. 349.

Hydrophis viperina: Günther, Reptiles of British India, 1864, p. 378; Boulenger, Ann. Mag. Nat. Hist., ser. 6, vol. 2, 1888, p. 44; Anderson, Proc. Zool. Soc. London, 1872, p. 40.

Hydrophis viperinus: de Rooij, Snakes of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 231-232; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1920, pp. 27-28, 56.

Praescutata viperina: Wall, The snakes of Ceylon, 1921, p. 391-396.

Hydrophis plumbea Murray, Journ. Bombay Nat. Hist. Soc., vol. 2, 1887, p. 34.

Hydrophis nigra Anderson, Proc. Zool. Soc. London, 1872, p. 399 (type-locality, Puri, Orissa); Fayrer, Thanatophidia of India, 1874, p. 28, pl. 25 (figure of the type); Wall, Mem. Asiat. Soc. Bengal, vol. 2, no. 8, 1909, p. 240, fig.

Hydrophis schistosus: Boulenger, Catalogue of the snakes in the British Mus., vol. 3, 1896, p. 274 (*non* Daudin).

Diagnosis: Characters of the genus. Blue-gray above, with a series of dark rhomboidal spots, 25 to 35 in number, which may anastomose on dorsum, or in older examples, disappear. Ventrals (in Thai specimens), ♂ 247, ♀ 2 + 2; head short somewhat flattened, distinct from neck, the snout broadly rounded; eye rather golden with a dark pupil.

Description of species (from No. 501, Songkhla): Rostral slightly wider than high, well visible above; nasals large, broadly in contact; nostrils dorsal, with sutures running from nostrils to first labials (very near to suture between first and second labials); prefrontals small, their common suture about one third that between nasals, separated from labials; frontal as broad as long, pointed posteriorly, more than double width of supraoculars, not as long as its distance from end of snout, shorter than parietals; two preoculars, upper much the largest; two postoculars, subequal; temporals, 242; supralabials, 7-8, only fourth bordering orbit; infralabials eight (nine) only three touching small anterior chinshields which are about half as large as second pair; latter separated posteriorly by a scale; four paired scales between chinshields and first ventral; a small cuneate scale on lip between third and fourth infralabial. Scalerows: 34 on occiput, 28 on neck, 42 middle of body; 34 before vent. Head scales with very numerous fine spinelike elevations; dorsal scales with a keel terminating in a slightly elevated spine; keels forming distinct straight lines on body; ventrals, anteriorly, may have six keels and/or tubercles arranged three or more on the side (the outer usually longest); more posteriorly tubercles reduced to two. Four preanal scales, two outer ones largest; two other scales narrowly excluded from vent (at one side one scale touches vent at a point); median preanal preceded by a pair of equally large scales; three ventrals preceding these divided; eye small, its vertical diameter less than its distance from lip.

Color in life: Deep bluish gray covering median 15 scalerows (occasionally part of adjoining rows); remainder of body cream-white. Top of head black; supralabials cream the adjoining parts of scales above, cream with a slight pigmentation; chin cream; a

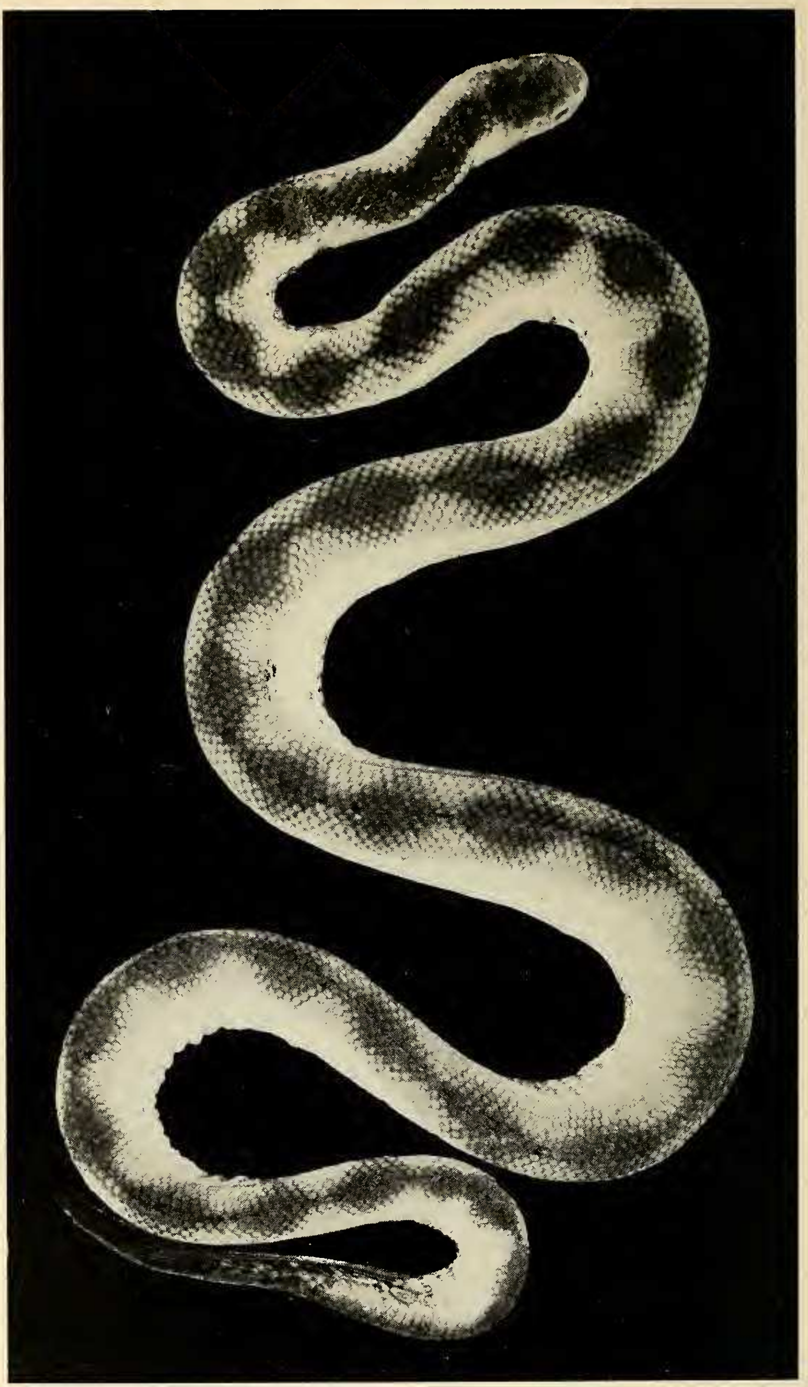

FIG. 103. *Praescutata viperina* (Schmidt). No. 34622, Songkhla, Songkhla province, southern Thailand. Actual total length, 528 mm.; tail, 58 mm.

series of 31 black rhombs on body, last one reaching vent; one at base of tail; remainder of tail uniformly black. Two fangs followed, after a well-marked diastema, by five teeth.

Measurements in mm.: Total length, 668; tail, 78; head-width, 13.1; head-length, 23.

Table of data on *Praescutata viperina*

Number	583	501	481	502	338
Sex	♂	♂	♀	♂yg.	♂
Length total	730	668	649	470	388
Length tail	77	78	75	53	61
Head-width	14.8	13.1	15	12	13
Head-length	25	23	21	18	18
Ventrals	265	236	267	224	242
Subcaudals	50	48	48	39	50
Neck scalerows	34	28	31	29	32
Middle body, scalerows	49	42	46	40	40
Before vent, scalerows	40	34	38	33	38
Body bands	34	31	32	33	35
Preoculars	1	2	2	1–2	2
Postoculars	2	2	2–3	2–2	2
Supralabials border eye	4th	4th	4th	4th	4th
Supralabials	7–7	7–8	8–8	8–8	7–8
Infralabials	8–8	8–9	8–9	8–8	8–8
Temporals	2+3 2+3	2+2 2+2	2+3 2+3	2+3 2+4	2+3 2+3
Intercalated scales on lower lip	1–1	1–1	2–2	0–0	1–1

Variation: The species varies from 226 to 274 in ventral count, and from 37 to 50 in the number of scalerows around body; 27 to 34 in scalerows around neck. In Thai specimens scale variation are as follows (means): Ventrals, females, 232; males, 247; scalerows on neck and body, females 28 to 40, of males 31 to 45 (based on counts published by M. Smith).

Malcolm Smith's description states that there are 7-9 supralabials with the third to fifth bordering eye (sometimes only two scales); usually only a single anterior temporal but sometimes two or three; one preocular (rarely two), and one or two postoculars.

Three color patterns are known:

1. Gray above, white below meeting on side with a fairly clear line of demarcation.
2. Gray above with 25-35 black rhomboids usually more or less confluent (the common form).
3. A completely banded form (three specimens, two from India, one from Borneo known).

Distribution: Only the first and second form have been taken along Thai coasts. The second form may lose the rhombs in old specimens.

A specimen having only 181 ventrals was taken at Koh Kong, Gulf of Thailand. Smith (1943) regards it as an anomaly, since a second specimen from the same locality has 232 and each has 27 scales about the neck, and 41 scalerows about body.

The species is known in the Bay of Bengal Persian Gulf, Indian Ocean, the Java Sea, and the coasts of China, Cochinchina, Java, and Borneo. The longest specimen reported is 925 mm. in length.

Nos. 502 and 338 resemble each other very much. The dorsal coloration is a very light gray with 33 black rhombs touching each other for the most part on the middorsal line. In each, half of the tail is black. The black rhombs encroach slightly on the white of side and venter.

The length of No. 502 is 470 mm.; the tail 53 mm.; there are 224 ventrals, and 39 subcaudals. The scale formula is: 29, 40, 33.

Genus *Enhydrina* Gray

Enhydrina Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 47 (type of genus, *valakadien* = *schistosa* Daudin).

Diagnosis: Maxillary bone not extending forward as far as the palatine; poison-fangs followed after an interval by three or four maxillary teeth. Body elongate, very strongly compressed posteriorly; scales imbricate or subimbricate in 49-66 rows on thickest part of body; ventrals small, distinct; head scales entire; nasals in contact, nostrils dorsal; mental very narrow, hidden in a mental groove.

Only a single species known. It is distributed along the southern Asiatic coasts from Persia to Cochin China, and south to the Australian coasts.

Enhydrina schistosa Daudin

(Fig. 104)

Hydrophis schistosus Daudin, Histoire naturelle générale et particulière des reptiles, vol. 7, 1803, p. 386 (based on Russell, Indian Serpents, vol. 2, pl. 10) (type-locality Tranquebar, Coromandel Coast of India); Schlegel, Essai sur la physionomie des serpents, vol. 2, p. 500, pl. 18; Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, p. 1344; Fischer, Abh. naturw. Ver. Hamburg, vol. 3, 1856, p. 48; Jan and Sordelli, Iconographie, générale des ophidiens, pt. 41, 1872, pl. 2.

Pelamis schistosus: Merrem, Tentamen systematis amphibiorum, 1820, p. 139.

Hydrus schistosus: Cantor, Catalogue of reptiles inhabiting the Malayan Peninsula and islands, 1847, p. 132.

Enhydrina schistosa: Stoliczka, Journ. Asiat. Soc. Bengal, vol. 39, 1870, p. 213; Anderson, Proc. Zool. Soc. London, 1871, p. 193; M. Smith, Monograph of the sea-snakes (Hydrophiidae) 1926, pp. 36-40, fig. 17; Cochran, Proc. U. S. Nat. Mus., vol. 77, 1930, p. 35; Bull. Raffles Mus., no. 3, 1930, pp. 73-74; The fauna of British India including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes; 1943, pp. 449-450, figs. 144-145; Bourret, Les serpents marins Indochine Française, 1936, p. 347; Tweedie, The snakes of Malaya, 1954, pp. 104-105, fig. 25; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1163.

Hydrus valakadyn Boie, Isis, 1827, p. 554 (Based on Russell, An account of Indian serpents . . . pl. 11; Mocquard, Les reptiles de l'Indo-Chine, 1907, p. 52.

Enhydrina valakadyen: Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 48; Stoliczka, Journ. Asiat. Soc. Bengal, 1872, p. 91.

Enhydrina valakadien: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 302-303; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 193; The fauna of British India . . . Reptilia and Batrachia, 1890, p. 406; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, no. 3, March 1915, pp. 177, 214; *ibid.* no. 4, Dec. 1915, p. 248 (Klong Yai, Trad, Thailand); Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 174).

Enhydrina valakadyn: Stejneger, U. S. Nat. Mus. Bull., 58, 1907, p. 437, pl. 25; Wall, Mem. Asiat. Soc. Bengal, vol. 2, (8), 1909, p. 191; M. Smith, Journ. Federated Malay States Mus., vol. 10, no. 1, July, 1920, pp. 30-32, 60; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 221; Wall, Ophidia Taprobanica or the snakes of Ceylon, 1921, p. 401, fig.

Disteira russelli Fitzinger, Isis, 1827, p. 733, (based on Russell, An account of Indian serpents, pl. 11).

Hydrophis bengalensis Gray, Zoological miscellany, 1842, p. 62 (type-locality, Bengal).

Enhydrina bengalensis: Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 48; Günther, The reptiles of British India, 1864, p. 381; Fayrer, Thanatophidia of India, 1874, col. pl. 18; Murray, The vertebrate zoology of Sind, 1884, p. 396.

Thalassophis werneri Schmidt, Abh. naturw. Ver. Hamburg, vol. 2 (2), 1852, p. 85, pl. 6.

Hydrophis subfasciata Gray, Zoological Miscellany, 1842, p. 62 (type-locality, Bengal).

Diagnosis: One of the largest sea-snakes (1400 mm.). Head scales complete; mental scale hidden in a groove; chinshields not or poorly developed; scales imbricate or subimbricate; ventrals distinct, narrow; scalerows, 49-66; poison-fangs followed by three or four teeth; nasals long, narrowed anteriorly; frontal small.

Description of species (from No. 34543 Songkhla): Rostral somewhat beaklike, small, projecting downward below level of supralabials, a little higher than wide, not or scarcely visible from above; nasals large, angular in shape, pointed anteriorly, nostrils on dorsal side of snout; prefrontals moderate, nearly as large as frontal; frontal pointed behind, very much shorter than its distance from end of snout, much shorter than parietals, slightly

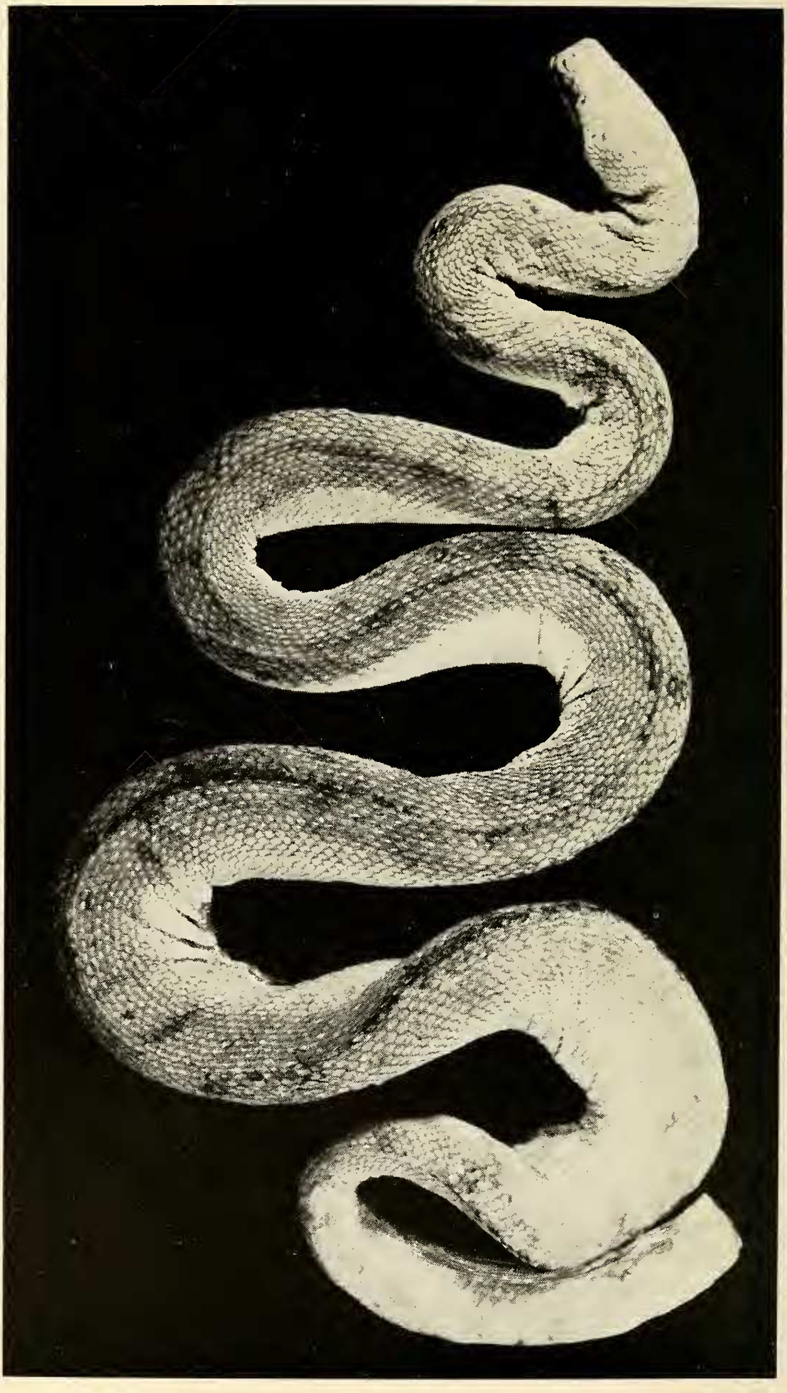

FIG. 104. *Enhydrina schistosa* (Daudin). No. 287, Songkhla, Songkhla province. Actual total length, 880 mm.; tail, 115 mm.

wider than supraoculars; internal faces of parietals with short entrant sutures. Supralabials eight (nine) fourth bordering eye; fifth smallest, last vertically placed; mental very small, elongate, in a groove between first infralabials; typical chinshields cannot be distinguished; first infralabials not in contact; infralabials, 11-11; one pre- and one postocular; two anterior temporals, upper largest.

Scalerow-formula: 45, 54, 38, scales hexagonal, with short keels. Ventrals, 291, subcaudals, 47; six small scales border front of vent. There are three grooved maxillary teeth following the two grooved fangs.

Color: The dorsal twenty scalerows of body, top of head and entire tail, dark slate-gray; remainder yellowish cream; posterior supralabials and lower part of temporals cream; anterior supralabials dark; cream to white on venter.

Measurements in mm.: Total length, 1282; tail, 144; depth of tail, 29; greatest depth of body, 64; width of head, 25; length of head, 40.

Variation: The described specimen when placed under clear liquid has an indication of darker bands on the posterior part of the body, that are not or scarcely visible otherwise. Young specimens have from 43 to 49 dim dorsal spots on body, which posteriorly extend down on the side and surround the body. Many of the younger specimens are greenish or olive above, the spots a little darker, the intervening areas yellowish and on sides distinctly greenish yellow. One young male is blue-gray above and almost paper white on the sides and venter. The tail is dark.

Of the snakes of this species taken at Songkhla about one half of the specimens have two postoculars. The first pair of chinshields are evident in some specimens but they are widely separated, by from three to five scales. In an occasional specimen a small "cuneate" scale appears on the oral border between the third and fourth supralabials. In none does the second labial touch the prefrontal. There are two anterior temporals usually present. The known variation in the number of ventrals is from 239 to 354, but it is considerably less on the average in Thai specimens. When separated according to sex they vary: 236 to 276 ♀, 243 to 292 ♂. Subcaudals, 37 to 50 ♀; 37 to 56 ♂.

M. Smith reports three specimens from Thailand having a broad black irregular band along either side of the body, a narrow ventral band, and irregular black dorsal spots.

Distribution: Found everywhere in Thai seas. It is said, that second only to *Pelamis platurus* it is the most widely spread species of the sea snakes known.

Remarks: This large species is potentially dangerous to man. Often when picked up by the tail the snake makes a definite effort to strike. Experiments with the venom show it to be proportionally more deadly than that of the cobra, producing death in a few minutes when injected into small animals. However no bites for human victims have been recorded to my knowledge.

These serpents grow to a length of 1400 mm. They have on occasion been found in fresh water many miles from the sea.

Genus *Acalyptophis* Boulenger

Acalyptus Duméril, Mem. Acad. Sci. Paris, vol. 23, 1853, p. 522 (type species *peronii*), (*non* Schoenheer).

Acalyptophis Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 269 (substitute name for *Acalyptus*).

Diagnosis: Maxillary bone longer than lower aspect of ectopterygoid; not extending as far forward as palatine; poison-fangs followed after an interval by from five to eight teeth; nasals divided, the nostril chiefly in outer nasal scale; scales subimbricate; ventrals smooth triangular, smaller than adjoining scales.

Only a single species known.

Acalyptophis peronii (Duméril)

(Fig. 105)

Acalyptus peronii A. M. C. Duméril, Mem. Acad. Sci. Paris, vol. 23, 1853, p. 522 (type-locality, ? "Nouvelle Holland").

Acalyptus superciliosus vel Peroni A. M. C. Duméril, Bibron and A. Duméril, Erpétologie générale . . . vol. 7, pt. 2, 1854, pp. 1341-1347; Günther, The reptiles of British India, 1864, p. 359.

Acalyptus superciliosus: Günther, The reptiles of British India, 1864, p. 359; Jan and Sordelli, Iconographie générale des ofidiens, vol. 3, livr. 40, May, 1872, p. 4, pl. 2, fig. 2 (drawing does not show the spinose appearance of head-scales).

Acalyptophis peronii: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 269-270; M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 102-103, 2 figs.

Diagnosis: Nasal scales in contact; frontal and parietal scales broken up more or less; head short, of moderate size; preoculars one or two, postoculars three or four; 19-23 scalerows on neck, 23-29 on body, scales feebly imbricate; ventrals smaller than adjoining scales and lacking a keel or tubercle. Some head scales spinose.

Description of species (from C.U. No. 510c, from Gulf of Siam): Thick-bodied snakes the width of head (11 mm.) less than one third of greatest width of body (36 mm.); height of tail, 28 mm.; rostral about one and one-half times as wide as high, slightly visible above; nasals divided, valvular nostril in small outer portion, barely separated from prefrontals; latter scales about as long as wide; frontal broken into seven scales; parietals broken into subequal scales scarcely distinguishable from occipital scales; one preocular; supraocular rather large, spinose on outer border; three postoculars, two upper ones raised into a posterior spine; two to three rows of temporals; seven supralabials, third largest, third and fourth bordering orbit; nine (ten) infralabials, fourth separated from labial border by two (or one) small scales, last two infralabials small;

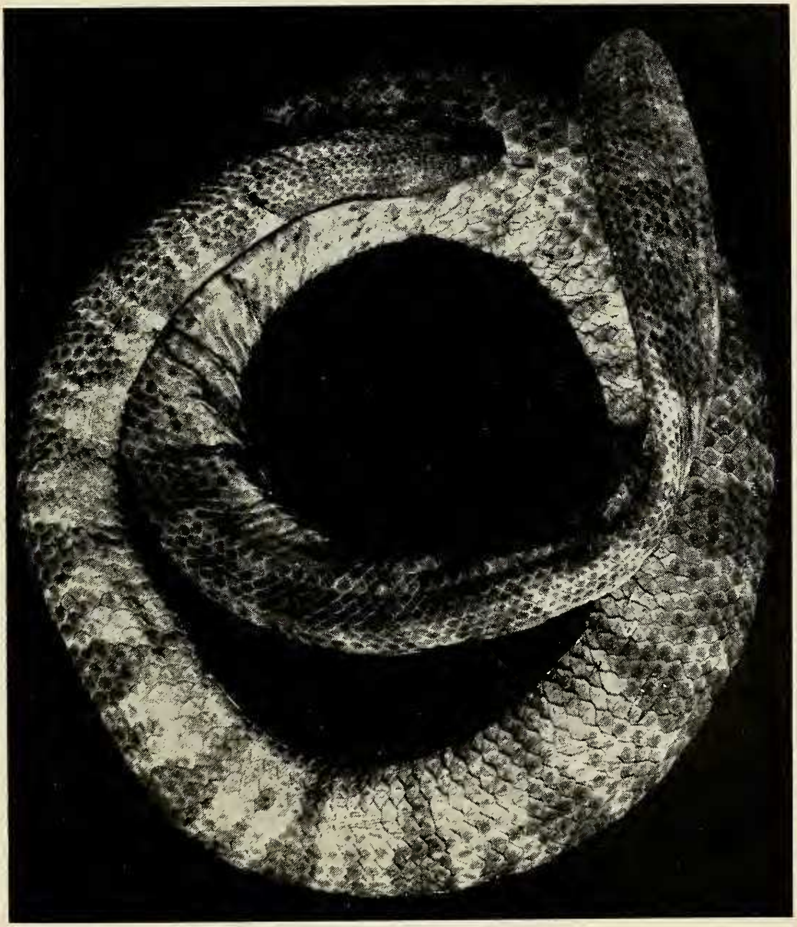

FIG. 105. *Acalyptophis peronii* (Duméril). C.U. No. 510c, Gulf of Siam. Actual total length, 861 mm.; tail, 97 mm.

two pairs of chinshields, anterior partially separating second pair; three infralabials border first pair; about seven paired scales between second chinshields and first ventral.

Scalerow-formula: 30 (occipital), 21, 26, 28; all scales (except ventrals) with a short longitudinal tubercle or keel. Ventrals, 196; subcaudals, 37; three small paired preanals; one enlarged lateral anal scale.

Color: Above gray with a series of transverse blotches of grayish black, wide (5 scales wide) on middorsal line narrowing on sides and venter to a width of two scales; there are indistinct dark blotches between bands, usually separated from a narrow ventral dark bar (dark centers on light scales), usually two scales wide.

Measurements in mm.: Total length, 861; tail, 97; width of head, 21; length of head, 26; height of tail, 28.

Variation: Ventral counts vary from 142 to 206. There may be six or seven supralabials but third and fourth border orbit; scalerows on neck vary between 19 and 23 rows; on middle of body from 23 to 29.

The spinelike condition of the scales about the eye and nostril is more evident in old adults.

Distribution: This is the first record of the species in the Gulf of Siam. It has been reported from Hong Kong, Torres straits and the Australian coasts.

It is regarded as a rare snake.

Genus *Thalassophis* Schmidt

Thalassophis Schmidt, Abh. naturw. Ver. Hamburg, vol. 2, 1852, p. 75 (*part.*) (type of genus, *anomalus*).

Diagnosis: Maxillary bone not reaching forward as far as palatine; poison-fangs followed after an interval by five teeth; headshields more or less broken up; nostrils superolateral; a pair of internasals usually present, separating nasals; body short, stout; scales juxtaposed in 31 to 35 rows; ventrals distinct, not or scarcely larger than adjacent scales (after M. Smith).

Only a single species known.

Thalassophis anomalus (Schmidt)

Thalassophis anomala Schmidt, Abh. naturw. Ver. Hamburg, vol. 2, 1852, p. 81, col. pl. 4 (type-locality, Java).

Hydrophis anomala: Fischer, Abh. naturw. Ver. Hamburg, vol. 3, 1856, p. 58; Günther, Reptiles of British India, 1864, p. 374; Jan and Sordelli, Iconographie générale des ophidiens, pt. 40, 1872, pl. 4.

Thalassophis anomalus: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 269; Wall, Mem. Asiat. Soc. Bengal, vol. 2, (8), 1909, p. 244; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 176, pl. —; Journ. Federated States Mus., vol. 10, 1920, p. 29; Ouwens, Giftslang. Nederlandisch Oost-India, 1916, p. 14, col. pl. 2; de Rooij, The reptilia of the Indo-Australian Archipelago, vol. 2, Ophidia; 1917, p. 223, fig. 86; M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 104-105, fig. 30; Bourret, Les serpents marins Indochine Française, 1935, p. 50; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 466-467 (Chanthaburi, Hua Hin); Tweedie, The snakes of Malaya, 1954, pp. 110-111; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1163-1164, fig. 33.

Diagnosis: A moderate-sized snake. Poison-fangs followed after a diastema by five maxillary teeth. Head-shields more or less broken up, especially rostral; a pair of internasals usually present, separating nasals. Scalerows, 31-35, juxtaposed, strongly keeled. Ventrals distinct but about as small as adjoining scales.

Description of species: Head short, body stout; rostral divided into four or five pieces; a pair of elongated internasals separating nasals; frontal small, variable in size, sometimes partially or completely divided; one preocular, one or two postoculars; temporals small, scarcely differentiated from body scales, usually 2 + 3 or 3 + 3; seven or eight supralabials, second normally in contact with prefrontal, the third, fourth, and fifth bordering orbit; four infralabials border two pairs of chinshields, of which second pair smaller than first and separated by small scales.

Scalerows: 27-30 on neck, 31-35 on body; posterior scales hexagonal in shape as broad or broader than long, juxtaposed and strongly keeled. Ventrals, 201 to 256, scarcely if any wider than adjacent scales, bicarinate; preanal shields feebly enlarged.

Color in life: Pale gray above, whitish below with from 30-36 dark dorsal bars broader than their interspaces and often connected vertebrally, tapering to a point on sides, or continued as narrow bands across venter; young may have a pale mark across snout extending backwards along either side of head.

Measurements in mm.: Male, total length, 810; tail, 19. Female, total length, 755; tail, 85 (from M. Smith).

Variation: The number of ventral scales varies considerably, the specimens from the Gulf of Siam having a higher average (241) than those from the East Indies (230).

Distribution: The species is known in the northern part of the Gulf of Siam and the coast of the southeastern part of Thailand and Cambodia. Elsewhere it is known from Borneo, Java, Sumatra and the Moluccas.

The distribution is rather unusual for a sea-snake since it is presumably absent from waters about the lower part of the Malay Peninsula.

Genus *Microcephalophis* Lesson

Microcephalophis Lesson, in Bélanger's, Voyage aux Indes orientales . . . 1834, p. 320 (type of genus, *Hydrus gracilis* Shaw).

Diagnosis: Maxillary bone longer than the ectopterygoid, extending as far as, or a little farther than palatine, concavity on its inner aspect very small; poison-fangs followed after a diastema by five or six teeth. Head very small, head shields regular. Nasal scutes in contact; body especially slender anteriorly, much larger posteriorly; ventrals small entire anteriorly or divided by a groove.

This genus is distributed on the Asiatic coast from the Persian Gulf to Hong Kong, occurring also in the Indo-Australian Archipelago and along the Australian coast. Two species, one with two recognized subspecies, are known. Only a single form of the latter species occurs along the coasts of Thailand.

Microcephalophis gracilis (Shaw)

Hydrus gracilis Shaw, General zoology, vol. 3, 1802, p. 560 (the type-locality unknown).

Microcephalophis gracilis gracilis (Shaw)

(Figs. 106, 107)

Disteria gracilis: Fitzinger, Neue Classification des Reptiles, 1826, p. 55; Stejneger, Herpetology of Japan, Bull. U. S. Nat. Mus., no. 58, 1907, pp. 427-428.

Distira gracilis: Wall, Mem. Asiat. Soc. Bengal, vol. 2 (8), 1909, p. 198, fig.

Microcephalophis gracilis: Lesson, in Bélanger, Voyage aux Indes-Orientales . . . 1834, p. 321, col. pl. 3; Gray, Catalogue of the snakes in the collection of the British Museum, 1849, p. 46; Wall, Snakes of Ceylon . . . 1921, pp. 325-330, fig. 62; M. Smith, Monograph of the sea-snakes (Hydrophiidae), Nov. 27, 1926, pp. 121-123, fig. 34; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 272-273, figs. 150-151; Kennady, Journ. Bombay Nat. Hist. Soc., 1937, p. 748; M. Smith, The sea-snakes Hydrophiidae in Dana Report No. 8, Copenhagen, 1935, p. 8; Bourret, Serpents marins de l'Indochine Française, 1935, p. 60; Les serpents de l'Indochine, 1936, p. 378, fig.; Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, p. 173; Smith, Bull. Raffles Mus., no. 3, 1930, pp. 86-87 (Singapore, Bay of Pattani); Tweedie, Snakes of Malaya, 1954, p. 112; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, Mar. 20, 1958, p. 1045.

Liopola gracilis: Gray, Zoological miscellany, 1842, p. 60.

Hydrophis Kadell-Nagam Boie, *in* Boie, Isis, 1827, p. 554 (Based on Russell's Indian Serpents, vol. 2, pl. 13.

Hydrophis gracilis: Duméril and Bibron, Erpétologie générale . . . vol. 7, 1854, pp. 1352-1354; Günther, The reptiles of British India, 1864, p. 373; Murray, Vertebrate zoology of Sind, 1884, p. 395; Anderson, Journ. Linn. Soc., vol. 21, 1889, p. 348; Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 280-281; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 191-192; Sclater, List of the snakes in the Indian Museum, 1891, p. 64; Wall, Mem. Asiat. Soc. Bengal, vol. 1, 1906, p. 283; de Rooij, Reptiles of the Indo-Australian Archipelago, Ophidia, 1917, p. 228; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1920, pp. 26-27, 55.

Hydrophis (Microcephalophis) gracilis: Boettger, Offenbach. Ver. Naturk., 1888, p. 90.

Hydrophis leprogaster Duméril and Bibron, in Fischer's Abhandl. naturw. ver Hamburg, vol. 3, 1856, p. 53.

Hydrophis microcephala: Jan and Sordelli, Iconographie générale des ophidiens, 1872, pt. 41, pl. 5.

Hydrophis guentheri Murray, Vertebrate zoology of Sind, 1884, p. 385.

Diagnosis: Head very small, anterior part of body very slender, cylindrical, posterior part much larger, strongly compressed, four to five times diameter of neck; prefrontal touching second but not third supralabial; scalerows, 17-19 on neck; snout projects beyond mouth; rostral somewhat inclined towards a horizontal position; a large anterior temporal followed by an equally large posterior temporal; no cuneate scales on oral border between infralabials.

Description of species (from No. 318, Songkhla, Thailand): Rostral a little higher than wide, rounding rather than angular behind, broadly visible, inclined towards a horizontal position; nasals large, broadly in contact, nostril in extreme outer posterior corner without a suture from nostril to labial; prefrontals about half area of nasals, a little larger than frontal; frontal distinctly narrower than the broad supraoculars, equal to its distance to anterior level of nostrils, about half length of parietals; one pre- and one postocular, both reaching much above eye level; diameter of eye equal or slightly larger than its distance from mouth; a large anterior temporal followed by another about equally as large; supralabials six, second touches prefrontal; third and fourth border orbit, sixth bordering upper curve of mouth; infralabials eight, five anterior large, followed by two smaller (one on one side), first four (or three) touch first pair of chinshields; each of first pair of chinshields nearly as large as combined second pair; seven scales between chinshields and first ventrals.

Scalerows: 21, 33, 28, the dorsal and lateral scales each with a small tubercle. Ventrals with two large tubercles; anterior ventrals undivided, a little larger than adjoining lateral scales, then more posteriorly they become divided by a median groove and from then on they are paired side by side or alternating with one

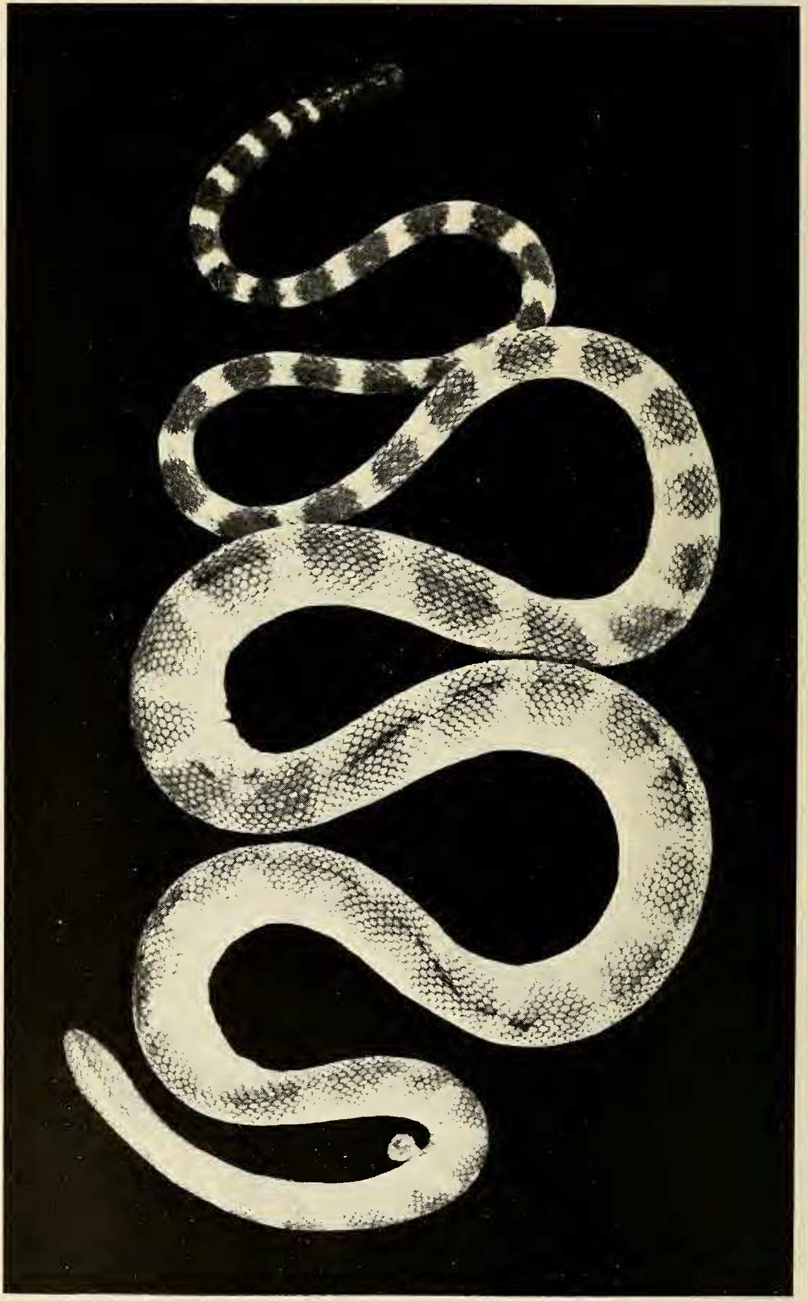

FIG. 106. *Microcephalophis gracilis* (Shaw). No. 579, Songkhla, Songkhla province, southern Thailand. Actual total length, 613 mm.; tail, 52 mm.

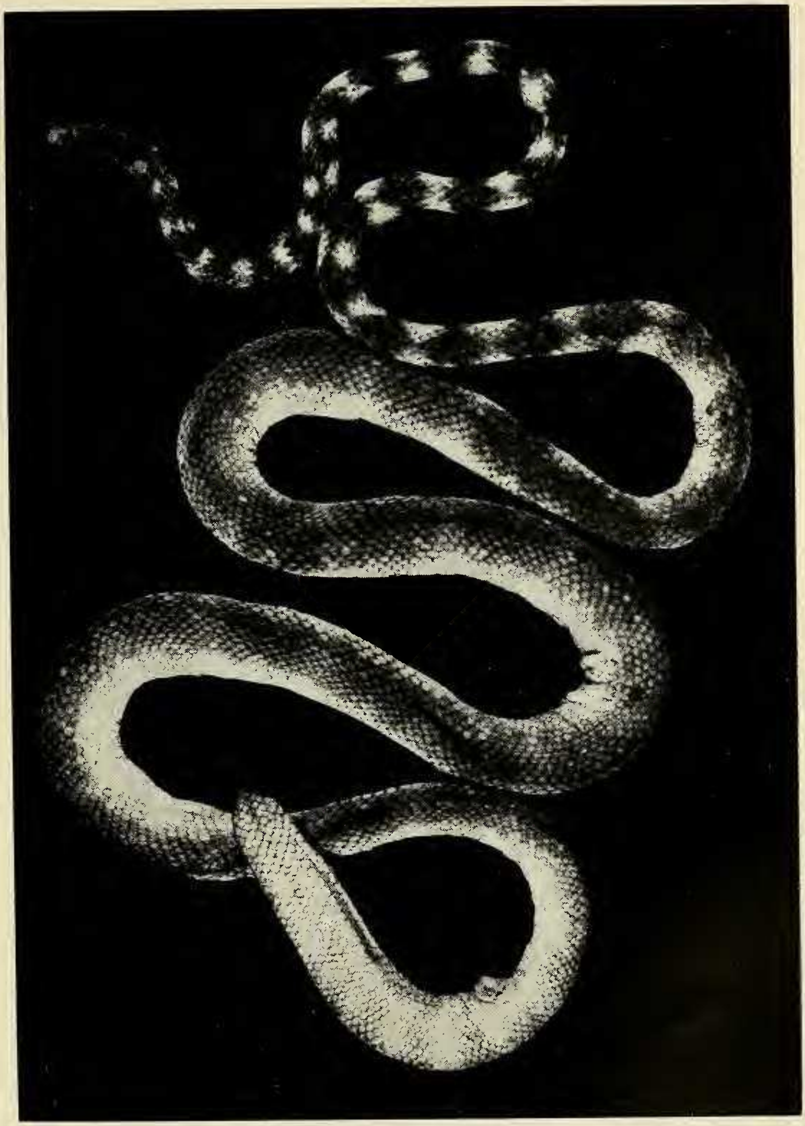

FIG. 107. *Microcephalophis gracilis* (Shaw). No. 317, Songkhla, Songkhla province, southern Thailand. Actual total length, 693 mm.; tail, 60 mm. (color variant).

another. This division begins at eleventh ventral; after the 130th all are divided, and groups of paired scales alternate with those where the pair alternates with one another.

Ventrals, 311; anals, slightly enlarged, median pair largest with three or two on each side; subcaudals, 36. Ventrals and subcaudals have the largest spines or tubercles.

Color in life: Above grayish, many scales having a lighter gray center. Anteriorly series of lateral cream or ivory spots present that may or may not join together on back; latter two thirds of body practically uniform, sides and venter becoming ivory-white as is the side of tail. Chin and head blackish with olive clouding on anterior head scales; neck rather dirty white.

Measurements in mm.: Total length, 452; tail, 64; head-width, 6; head-length, 13; height of body, 22; depth of tail, 15.

Variation: The attached table shows variation in five specimens from the same locality (Songkhla).

Variation: The younger specimens have the bands on body moderately distinct; these number from 52 to 58 in males; 61 in one female; in two of the older specimens the bands lack definition and cannot be counted. In younger specimens the head and the anterior part of the body are deep black, in older specimens there is some lighter color in evidence.

One specimen had the second supralabial excluded from the prefrontal. The first pair of infralabials are sometimes as large as

Table of data on *Microcephalophis gracilis*

NUMBER	318	572	559	579	317
Sex	♂	♂	♀	♂	♂
Total length	752	705	820	613	693
Tail	64	61	62	52	60
Head, length	13	11	12.2	9.8	11
Head, width	6	4	5	4.5	5
Height of body	22	15.5	23	14	19
Preocular	1–1	1–1	1–1	1–1	1–1
Postocular	1–1	1–1	1–1	1–1	1–1
Temporals	1+1	1+1	1+1	1+1	1+1
Supralabials	6–6	6–6	6–6	6–6	6–6
Infralabials	8–8	8–8	8–8	8–8	8–8
Scalerows, neck	21	21	21	19	19
Scalerows, widest part	33	33	33	33	33
Ventrals	311	295	362	302	296
Subcaudals	36	37	41	38	34
Bands, body and tail	dim	dim	61	58	52

the combined chinshields, sometimes a little smaller. The known variation in ventral counts is from 220 to 362, the average for Thai specimens being 308.

Remarks: As yet this species is not very well known from Thai waters. Malcolm Smith reports but two specimens, I have but five. Three of my specimens have 21 scalerows around the body. With sufficient material it may be possible to define a race having a greater number of ventrals, and a very small frontal scale. Other differences may obtain. These snakes, because of the minute head, and fangs with a dimension of one-half millimeter in length, cannot be regarded as being dangerous to man.

Distribution: In Thailand the species occurs along the coast bordering the Gulf of Siam. I have no reports from the Bay of Bengal.

Genus *Pelamis*

Pelamis platurus (Linnaeus)

(Fig. 108)

Anguis platurus Linnaeus, Systema Naturae, 12th Ed., 1766, p. 391 (type-locality unknown) (see Andersson and Linnaeus, *loc. cit.*).

Hydrophis platura: Latreille, Histoire Naturelle des reptiles, vol. 4, 1802, p. 197.

Hydrus platurus: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed. vol. 3, 1896, p. 267; Stejneger, Bull. U. S. Nat. Mus., no. 58, 1907, pp. 439-442, figs. 355-357; Wall, Mem. Asiat. Soc. Bengal, vol. 2, (8), 1909, p. 248; Ophidia Taprobanica or the snakes of Ceylon, 1921, pp. 420-426, fig. 80; de Rooij, Snakes of the Indo-Australian Archipelago vol. 2, Ophidia; 1917, pp. 224-225, fig. 88; M. Smith, Journ. Federated States Mus., vol. 10, 1920, p. 5; Lord, Proc. Royal Soc. Tasmania, 1919, p. 22; Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 172.

Pelamis platurus: Stoliczka, Proc. Asiat. Soc. Bengal, 1872, p. 92; M. Smith, Monograph on the sea-snakes (Hydrophiidae) 1926, p. 116, fig.; Bull. Raffles Mus., no.3, 1930, p. 85; Bourret, Les serpents marins de l'Indochine Française 1935, p. 57; Tweedie, Snakes of Malaya, 1954, pp. 112-113. H. Smith and Taylor, U. S. Nat. Mus. Bull., no. 187, 1945, pp. 176-177; Taylor, Univ. Kansas Sci. Bull., vol. 33, pt. 2, 1950, pp. 591-592.

Pelamydrus platurus: Stejneger, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 111; Taylor, Snakes of the Philippine Islands, 1922, p. 253.

Hydrus bicolor: Schneider, Historiae amphibiorum naturalis et literariae. fasc. primus, 1799, p. 242.

Pelamis bicolor: Daudin, Histoire naturelle générale et particulière des reptiles, vol. 7, 1803, p. 366; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 35, 36, 63; Gray, Catalogue of the snakes in the British Museum, 1849, p. 41; Cantor, Catalogue of the reptiles inhabiting the Malay Peninsula and Islands, reprinted from Journ. Asiat. Soc. Bengal., vol. 16, pt. 2, p. 134; Duméril, Bibron, and Duméril, Erpétologie générale, . . . vol. 7, pp. 1335-1338; Günther, Reptiles of British India, 1864, p. 382; Krefft, The snakes of Australia, 1869, p. 98, pl. 12; Strauch, Mem. Acad. Sci. Petersburg, vol. 21, 1873, p. 199; Fayrer, Thanatophidia of India, 1874, color pl. 17; Hilgendorf, Mitth. Deutsch Ges.

Ost-Asiens, vol. 1, 1876, p. 30; Peters and Doria, Ann. Mus. Civ. Genova, vol. 13, 1878, p. 416; Murray, Vertebrate zoology of Sind, 1883, p. 397.

Hydrophis (Pelamis) bicolor: Fischer, Abh. naturw. Ver. Hamburg, vol. 3, 1856, p. 61.

Hydrophis bicolor: Jan and Sordelli, Iconographie générale des Ofidiens, pt. 40, pls. 2, 3; Okada, Catalogue of the Vertebrates of Japan, 1891, p. 69.

Pelamis schneideri Rafinesque, Amer. Month. Mag., vol. 1, 1817, p. 437 (substitute name for *bicolor*).

Hydrophis pelamis: Schlegel, Essai sur la physionomie des serpents, vol. 1, 1837, (Atlas, pl. 18); Fauna Japonica, 1837, p. 90, pl. 8; Boettger, Ver. Nat. Offenbach, vols. 17-18, Ber., 1878, p. 8.

Pelamis ornata: Gray, Zoological miscellany, 1842, p. 60; Catalogue of the snakes in the collection of the British Museum, 1849, p. 43.

Hydrus platurus ornatus: Barbour, Mem. Mus. Comp. Zool. Harvard Col., vol. 44, 1912, p. 129.

Pelamis bicolor variegata Duméril and Bibron, Erpétologie générale . . . vol. 7, 1854, p. 1337; Jan. Iconographie générale des ophidiens, pt. 40, 1872, pl. 3. (Figured in Russell, vol. 2, pl. 12) (type-locality, Celebes, near Macassar).

Pelamis bicolor sinuata Duméril, Bibron, and Duméril, Erpétologie générale, vol. 7, 1854, p. 1338 (type-locality unknown).

Hydrophis (Pelamis) bicolor alternans Fischer, Abh. naturw. Ver. Hamburg, vol. 3, 1856, p. 63 (substitute name for *variegata*).

Hydrophis bicolor maculata Jan and Sordelli, Iconographie générale des ophidiens, livr. 40, 1872, pl. 3, fig. 1, (type-locality, Mer des Indes).

Diagnosis: A medium-sized sea-snake reaching about 900 mm. in length; head somewhat flattened with a narrow elongate snout; body much compressed posteriorly; one or two preoculars, two or three postoculars; a single pair of chinshields developed; 49-67 scalerows, scales more or less quadrangular, lower rows with one or two tubercles; ventrals, 264-406, usually divided mesially, sometimes almost indistinguishable from body scales. Uniform black above, yellow-olive or cream on sides, variable.

Description of species (from No. 503 ♂, Songkhla): Rostral small, much wider than high, scarcely larger than first labial, and scarcely visible from above; nasals large, in contact for their entire length; nostrils dorsal; prefrontals large, more than two third area of nasals; frontal a little longer than its distance from end of snout, as long as parietals, sides subparallel; parietals partially cut by suture; a large preocular, much longer than high; diameter of eye double its distance from mouth; three (two) postoculars, two anterior temporals, the arrangement on one side is $\frac{1}{3} + 2$; on other $\frac{1}{2} + 3$; supralabials eight, second largest, in contact with prefrontal, fourth borders eye; no suboculars; sixth and seventh supra-

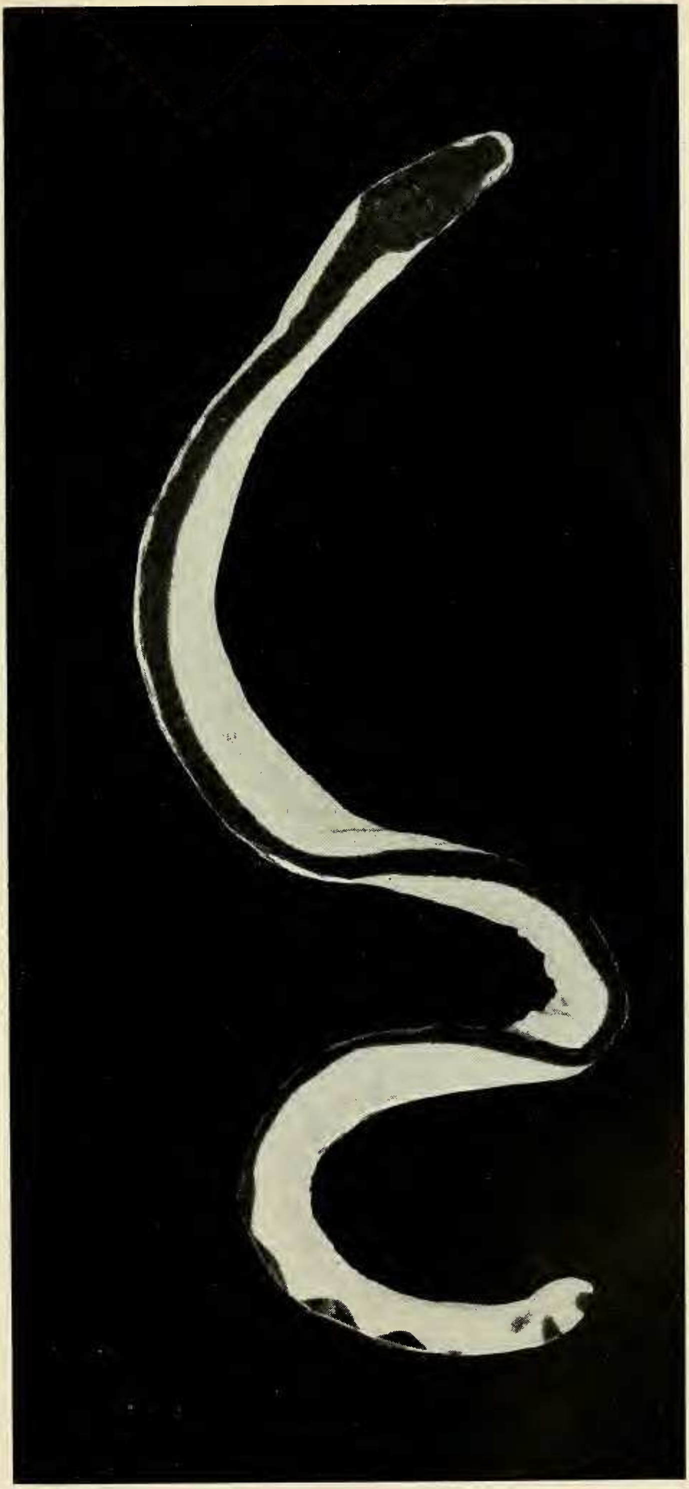

Fig. 108. *Pelamis platurus* (Linnaeus). No. 3415 young, Songkhla, Songkhla province, Thailand. Actual total length, 212 mm.: tail. 27 mm.

labials smallest; infralabials eleven, two (or three) bordering a pair of chinshields which are separated by a scale; second pair of chinshields not differentiated.

Scalerows: 44 occiput, 41 neck, 49 widest part of body, 35 before vent; scales generally subquadrangular, dorsals smooth, laterals with one or, more frequently, two tubercles toward posterior part of body. Ventrals, 295 (scales counted to chinshields since anterior ventrals are not differentiated) two enlarged anals separated by a median smaller scale; subcaudals, 46.

Color: Top of head, and median 12 scalerows (10 posteriorly) deep black; remainder of body bistre to yellowish olive, each scale with a lighter center. A short distance before level of vent, the black color of the back begins to separate into spots, and these sometimes become connected with other spots, while on middorsal line the lighter color tending to separate into spots; a black anal spot and two black spots on sides of tail. Chin, infralabials, and lower part of supralabials dirty indefinite gray.

Measurements in mm.: Total length, 384; tail, 50; width of head, 12.8; length of head, 23; depth of body, 18; depth of tail, 9.5.

Variation: This species has produced a large number of color forms that are usually regarded unworthy of recognition even as subspecies since several of these varieties may occur together. However Deraniyagala has recently recognized some ten color varieties occurring in the waters about Ceylon. All have been given names.

The scalerows on the body vary from 49 to 67 in number; the ventrals from 264 to 406.

I obtained a young specimen at Songkhla. In this the black dorsal stripe covers the six median scalerows and parts of the adjoining row (figured).

Distribution: The species is widely distributed from Possiet Bay, Siberia, south to Tasmania. Its presence on the west coast of the Western Hemisphere gives rise to the question of its manner of arrival there. I had the temerity to suggest that it was carried accidentally by the Spanish galleons to the Mexican Coast in historic times only to learn later that Dávila in 1504 reports it from Bahia de Culebras in Costa Rica, where it was common. The presence of the snake in Siberia suggests its adaptation to waters of lower temperature and at some time it most probably made its way around the Aleutian Islands perhaps during one of the interglacial periods when a milder climate obtained. The species occurs on the Mexican Coast north, nearly to the boundary of the United States. None, however, to my knowledge has been taken in waters north of the United States boundary.

The species is present along the coasts of Thailand bordering the Gulf of Siam and perhaps as well everywhere in the Gulf. The species is known to maintain itself many miles from shore. Several specimens were collected by the Naga Expedition 1959-61 in waters of southeastern Asia on the surface of the water with dip nets. I have collected only a single coastal specimen along the shore.

Lapemis Gray

Lapemis Gray, Illustrations of Indian Zoology, vol. 2, 1935, color plate 87, fig. 2 (type of genus, *Lapemis curtus*).

Enhydris (*part.*) Merrem, Tentamen systematis amphiorum, 1820, p. 140.

Hydrophis (*part.*) Schlegel, Essai sur la physionomie des serpens, vol. 2, 1837, p. 488.

Diagnosis: Maxillary bone longer than lower aspect of ectopterygoid, extending forwards as far, or nearly as far, as palatine; poison-fangs followed after a diastema by from three to six teeth; nostrils superior; nasal shields in contact with one another; head large, body stout; scales hexagonal or quadrangular, juxtaposed, the scales of lowermost rows larger than others; ventrals small, usually distinct anteriorly, very small or absent posteriorly.

Of the two recognized species one occurs in the Gulf of Siam, where it is very common.

Lapemis hardwickii Gray

(Figs. 109, 110)

Lapemis hardwickii Gray, Illustrations of Indian Zoology, vol. 2, 1834, pl. 87, colored fig. (type-locality, India); Günther, The reptiles of British India, 1864, p. 380 ("several circumstances lead me to suppose that it [the type] was procured in Pinang"); Stejneger, Bull. U. S. Museum, no. 58, 1907, pp. 435-436, pl. 24; Longman, Mem. Queensland Mus., vol. 6, 1918, p. 41; Wall, Ophidia Taprobanica, or the snakes of Ceylon, 1921, pp. 416-420, fig. 78; M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 108-112, fig. 32 (skull); Bull. Raffles Mus., no. 3, 1930, pp. 84-85; Tweedie, The snakes of Malaya, 1954, p. 111; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1163, fig. 33 (Phet Buri province, Thailand).

Hydrophis hardwickii: Günther, Fauna of British India, 1864, p. 380, pl. 25; Müller, Verh. naturf. Ges. Basel, vol. 7, 1882, p. 170; Anderson, Journ. Linn. Soc., vol. 21, 1889, p. 348.

Enhydris curtus Laidlaw, Proc. Zool. Soc. London, 1901, p. 581 (*fide* M. Smith).

Enhydris hardwickii: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 301; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 193; Hanitsch, Reptiles of the Raffles Mus., 1897, p. 16; Mocquard, Les Reptiles de l'Indochine, 1907, p. 52; Wall, Mem. Asiat. Soc. Bengal, vol. 2, no. 8, 1909, p. 247, fig. and pl. 9; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1915, p. 248; Journ. Bombay Nat. Hist. Soc., vol. 23, 1915, pp. 785-787; Journ. Federated Malay States Mus., vol. 10, 1920, pp. 32-34; 62. Taylor, Snakes of the Philippines, 1922, p. 249, fig.; Ouwens, Giftsch. Ned. Oost-India, col. pl., 1916; de Rooij, The Reptilia of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 240, fig. 90.

Hydrophis pelamidoides Schlegel, Essai sur la physionomie des serpents, vol. 2, 1937, p. 512, pl. 18 (type-locality, Indian Seas); Fauna Japonica, reptiles, 1838, p. 91, pl. 9; Duméril, Bibron, and Duméril, Erpétologie générale . . . vol. 7, 1854, p. 1345; Jan and Sordelli, Iconographie générale des ophidiens, livr. 41, 1872, pl. 3.

H. (Pelamis) pelamidoides: Fischer, Abh. naturw. Ver. Hamburg, vol. 3, 1856, p. 64.

H. (Pelamis) pelamidoides annulata, ibid., p. 67, color pl. 3.

Lapemis loreatus Gray, Ann. Mag. Nat. Hist., vol. 9, 1843, p. 46 (type-locality Borneo).

Hydrophis loreatus: Günther, Reptiles of British India, 1864, p. 380; Peters and Doria, Ann. Mus. Civ. Genova, vol. 13, 1876, p. 416; Boettger, Zool. Anz., 1888, p. 396.

Hydrophis abbreviatus Jan, Elenco Syst. Ofid., 1863, p. 109; Jan and Sordelli, Iconographie générale des ophidiens, livr. 40, 1872, pl. 4 (type-locality, Manila).

Hydrophis brevis, Jan, Elenco Syst. Ofid., 1863 p. 109; Jan and Sordelli, Iconographie générale des ophidiens, 1872, livr. 40; pl. 5 (type-locality, Manila P. I.).

Diagnosis: A short, rather stout snake with relatively large head. Parietals entire; ventrals small anteriorly, very small or absent posteriorly; poison-fangs followed by from three to six teeth; scales quadrangular or hexagonal, juxtaposed; ventral scales largest; chinshields poorly developed and separated by small scales. Ventrals, 114-230. Greenish or yellowish olive, with 35-50 darker olive bands tapering to a point on sides.

Description of species (from No. 564, Songkhla): Rostral wider than high, visible from above only as a line; nasals large, broadly in contact; a suture from nostril to suture between first and second supralabials (absent on left side); prefrontals large, posterior part forming an angle between frontal and supraocular; frontal wider than supraoculars, slightly shorter than its distance from rostral, shorter than parietal; one preocular, one postocular; two anterior temporals followed by three (on left side three anterior); two temporals and parietal border postocular; supralabials seven, second divided leaving a large "loreal"; third and fourth border orbit; infralabials ten or eleven, two bordering first chinshield; second pair of chinshields slender, elongate; both pairs separated by small scales, and except for their relationship to infralabials scarcely discernible as such; fourth infralabial largest.

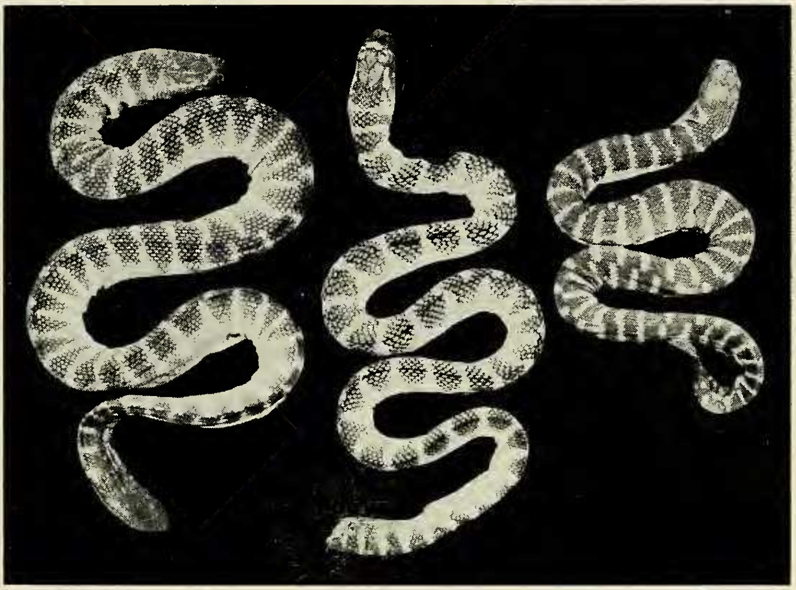

FIG. 109. *Lapemis hardwickii* Gray. Left figure, No. 34584, actual total length, 412 mm.; middle figure, No. 34659, length, 401 mm.; right figure, No. 34635, length, 290 mm. All from Songkhla, Songkhla province, southern Thailand.

Scalerows: 26 (neck), 27, 31, the scales quadrangular, those on venter much the largest, juxtaposed, smooth, for the most part; a few ventral rows with single small tubercles (or in old males, strong tubercles).

Ventrals cannot be counted with certainty since many are missing; count of transverse scalerows, 140; subcaudals, 40; outer anals enlarged, separated by a smaller median pair.

Color: Head blackish with some yellowish marks above eyes and across prefrontals; labials and chin blackish; body yellowish with dark olive bars across back terminating in a point on sides, narrowly separated dorsally, usually by only one transverse scalerow; 42 bars on body, seven on tail; lower part and terminus of tail black.

Variation: Variation in the head scales is considerable. A large proportion of the specimens have three anterior temporals; the sixth supralabials is normally small, but frequently fuses to a secondary temporal and borders the mouth as a large scale; often two postoculars are present.

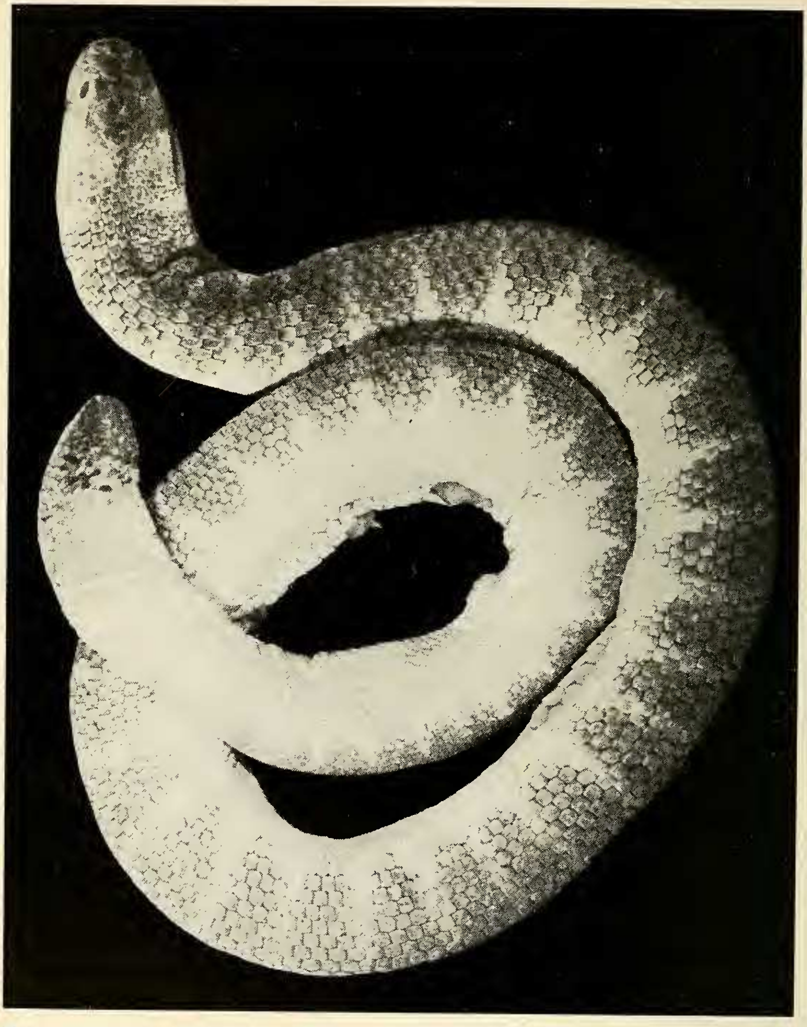

FIG. 110. *Lapemis hardwickii* Gray. No. 34578, Songkhla, Songkhla province, southern Thailand. Actual total length, 694 mm.; tail, 70 mm.

The scales around neck vary in number between 23 and 33 in males, 27 and 35 in females; around the body, at about the middle, 25 to 37 in males, 33 to 41 in females. The range of ventrals is 114-186 in males; 141-230 in females.

The bars vary between 35 and 50 and rarely encircle the body completely; the bars rarely may unite to form a uniformly colored back. A ventral or lateral black stripe may be present.

Distribution: The species is common in the Gulf of Siam at least along the eastern side of the peninsula. It is seemingly less common about the shores of Indo-China. It is known to occur from Japan to Australia, and on the coasts of the larger islands of the Indo-Australian Archipelago and the Philippines.

Addenda: An unusual specimen No. 34636 from Songkhla is referred to this species. The median eight to ten scales are deep black with a series of 43 (44) lateral bars of dull greenish gray (frequently joined together low on sides), outlining bars of black which become narrow on the sides. A median ventral series of large spots sometimes extending nearly half way up on the sides is present.

The head, chin, and the ventral part of neck are black. The tail is black with only a trace of two bars near the base. The anal region is white. The scales of the head as well as those of the body conform in essential detail to the described specimen.

Certain variants from Songkhla are figured. Fig. 109.

Genus *Hydrophis* Latreille

Hydrophis Latreille, Histoire naturelle des reptiles, vol. 4, 1802, p. 193 (type of genus, *fasciatus*).

Diagnosis: Maxillary bone not extending forwards beyond palatine; poison-fangs followed by from one to 18 teeth. Head shields unbroken; nostrils dorsal, the nasals in contact with one another; scales imbricate, subimbricate, or juxtaposed, in 29-57 rows on thickest part of body. Ventrals very small but normally distinct throughout. Head large or small.

The genus is represented in waters adjacent to Thailand by at least eight species and subspecies.

KEY * TO THE THAI SPECIES OF *Hydrophis*

1. Scales distinctly imbricate throughout body; with more or less rounded tips posteriorly 2

   Scales quadrangular or hexagonal their posterior tips blunt or truncate, juxtaposed, or slightly subimbricate 3

2. Normally two anterior temporals, five to six maxillary teeth behind poison-fangs; scales about middle of body, 37-47; larger, reaching two meters in length; usually yellowish green to olive, banded with blackish; head medium, two unsegmented infralabials .... *cyanocinctus*

   Normally a single anterior temporal; five to six maxillary teeth behind poison-fangs; scales about middle of body, 31 to 37; smaller, not or rarely reaching one and a half meters in length; head medium........... *klossi*

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* The size of head and neck in proportion to the greatest diameter of the body is a significant specific character in the sea-serpents. In the key the heads are described as from "large" to "small,"—"large" refering to species having the body one and a half to rarely twice diameter of neck; "medium," from about two to two and three fourths times, "small" two and a half to three, "very small" from three to four (or a little more) times diameter of neck. The actual width of the head of these four criteria in millimeters might be approximately 19-22, 14-20, 7-10, 5-6.

Eight to eighteen maxillary teeth behind poison-fangs; head large to small, 4

Five to six maxillary teeth behind poison-fangs, head very small....... 6

4. Head large, maxillary teeth, 10-13 behind poison-fangs; normally two anterior temporals; usually less than one meter in length; no small cuneate scales bordering oral margin; usually pale grayish or olivaceous with bars and spots.. *o. ornatus*

Head medium.. 5

5. Normally two anterior temporals; 14-18 maxillary teeth following poison-fangs; usually banded bluish-gray; usually less than a meter in length, *caerulescens*

Eight to ten maxillary teeth following the poison-fangs; usually a single anterior temporal; usually less than a meter in length......... *torquatus*

6. Five or six maxillary teeth behind poison-fangs; anterior part of body very slender; a single anterior temporal followed by an equally large secondary temporal, sometimes divided; two to four scales border parietals between temporals; a small cuneate scale on oral margin between third and fourth supralabials; head and anterior part of body shiny black; 39 to 49 scalerows at middle of body......................... *fasciatus atriceps*

A single anterior temporal bordering or almost touching mouth, followed by a vertically divided temporal (rarely single); 37 to 45 scalerows at middle of body, grayish above, the anterior bands encircling body, posteriorly bands incomplete ventrally; four to seven scales bordering parietals between temporals................................ *brookei*

(*Hydrophis mamillaris* is intentionally omitted from the key)

Hydrophis cyanocinctus Daudin

(Figs. 111, 112)

Hydrophis cyanocinctus * Daudin, Histoire naturelle des reptiles, vol. 7, 1803, p. 383 (type-locality, Sunderbunds *); Boettger, Ber. Offenb. Ver. Naturk, Band 26-28, 1888, p. 88; Fayrer, The Thanatophidia of India . . . 1874, p. 26, pl. 23; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 185-186; Wall, Journ. Bombay Soc. Nat. Hist., vol. 23, 1914, p. 375; *ibid.*, vol. 25, June, 1918, pp. 599, 600, 605, 754, with diagram; *ibid.*, vol. 26, 1919, p. 433, fig.; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1920, p. 8; Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 56-63, text fig. 20; pl. 1, fig. 4; Bull. Raffles Mus., no. 3, 1930, p. 77; Pope, Reptiles of China, 1935, p. 358; Bourret, Serpents marins Indochine Française, 1935, pp. 32-35, pl. 1, fig. F; pl. VI, fig. A; text fig. 6; Les serpents de l'Indochine, 1936, p. 353, fig.; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 454-456, figs. 146-147; Tweedie, The snakes of Malaya, 1954, pp. 107, 125.

Distira cyanocincta Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 294-296; Wall, Proc. Zool. Soc. London, 1903, pp. 96, 101; and Mem. Asiat. Soc. Bengal, vol. 1, 1906, p. 291; *ibid.*, vol. 2, 1909, p. 217, fig. and pl. 8 (*part.*).

Disteira cyanocincta Stejneger, Herpetology of Japan, 1907, p. 428; Taylor, Snakes of the Philippines, 1921, p. 245 (*part.*).

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* Presumably based on Russel's figure, p. 10, pl. 9, vol. 2 in A continuation of an account of Indian Serpents.

NOTE: A large number of nominal species described by various authors have been synonymized by Boulenger, Wall or M. Smith. The following species are so regarded: (See Malcolm Smith, [1926] for full synonymy). *Hydrophis striata* Schlegel, *chittul* Rafinesque, *subannulata* Gray, *aspera* Gray, *westermanni* Jan, *trachyceps* Theobald, *crassicollis* Anderson, *tuberculata* Anderson, *dayanus* Stoliczka, *tenuicollis* Peters, *taprobanica* Haly, *phipsoni* Murray, *D. macfarlani* Boulenger, *saravacensis* Boulenger, *longissima* Rosen. It seems likely that certain of these will eventually prove to be species or geographical subspecies.

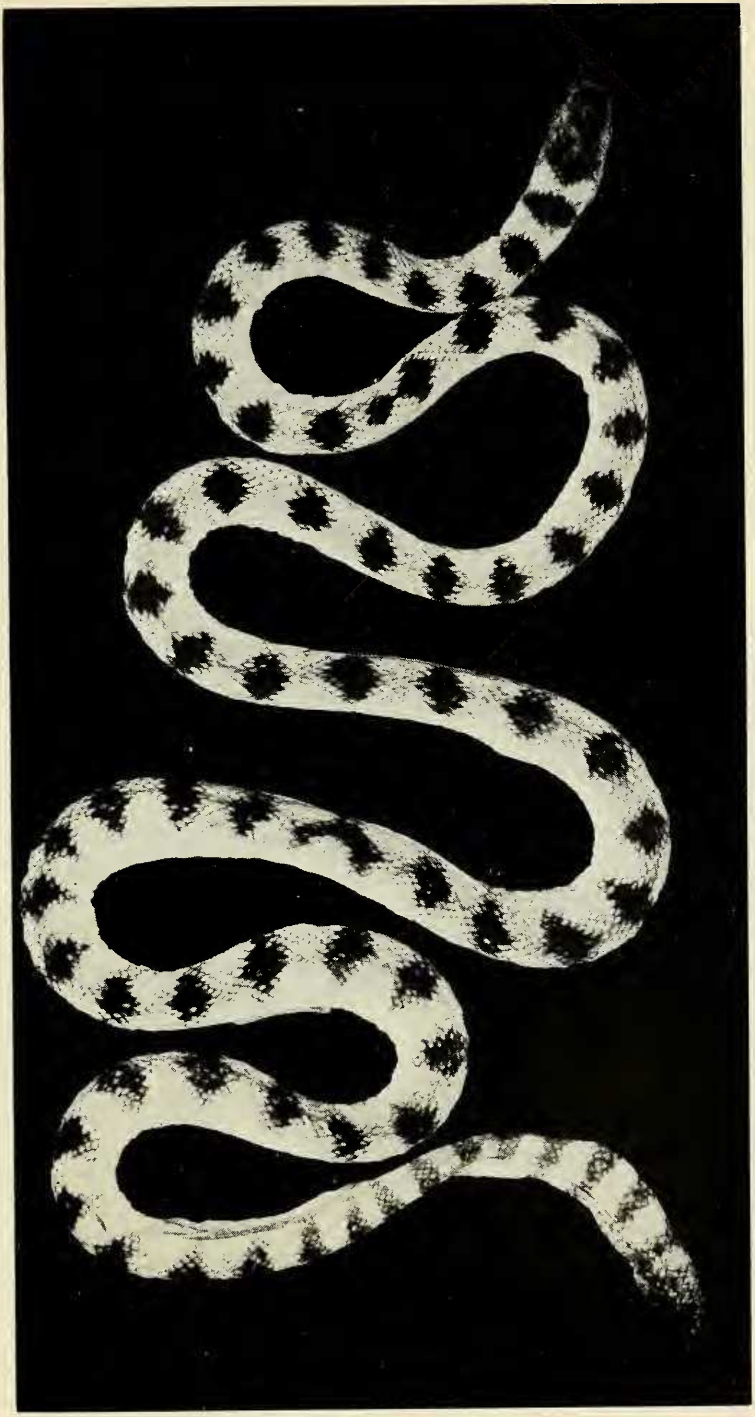

FIG. 111. *Hydrophis cyanocinctus* Daudin. No. 34612, Songkhla, Songkhla province, southern Thailand. Actual total length, 620 mm.; tail, 60 mm.

This species is very likely to be confused with *Hydrophis spiralis*. The latter species is not known from the seas bordering Thailand; however its presence on the west coast of the peninsula is probably, since it is known from Penang.

Diagnosis: A very large sea-snake reaching nearly two meters in length (1885 mm.; tail, 135 mm.). Five to seven teeth follow two large grooved fangs, after a short diastema; one preocular; two postoculars; usually two anterior temporals, variable in their relationships; second labial touching prefrontal; third, fourth, and fifth, or only fourth and fifth border orbit; three infralabials border first chinshields; yellowish with black rhombs on back, sometimes traceable around body, often becoming much narrower on venter (fading with age).

Description of species (from No. 696, Songkhla): Rostral about as high as wide, well visable above; snout sloping somewhat toward tip; nasals large, broadly in contact; the nostrils in posterior outer part of nasal scales; a suture from nostril to second labial may partly divide nasal scale; prefrontals touching second labial and preocular; frontal one and two-thirds times as long as wide, a little longer than its distance to rostral, shorter than parietals; latter scales more than twice as long as wide; one preocular, two postoculars, upper touching parietal, both touching upper temporal on right side (one only on left); supralabials eight, the third, fourth, and fifth bordering orbit (fifth on right side divided by a horizontal suture); infralabials (scales bordering lip), 9-10; first three infralabials border first chinshields, third separated from lip by a continuous series of small scales; second chinshields a little smaller than first pair, touching each other for a short distance, posteriorly separated by a pair of scales.

Scalerow-formula: 30 (29) (on neck), 39, 37; scales pointed posteriorly, longer than wide except anteriorly; scales keeled lightly; keels of dorsal scales divided into two short keels or tubercles; ventrals, 378, anteriorly with a width more than double adjoining scalerows; posteriorly smaller but usually larger than adjoining rows; ventrals usually lacking keels or tubercles; subcaudals, 45. Maxillary teeth, 2 + 7; four large elongated anal scales.

Color in life: Above yellowish olive on 24 dorsal rows; remainder of body scales yellow-cream; a series of 66 deep black rhombs on body reaching down to middle of side, and then continued around venter as a slightly darker shadow scarcely discernible but slightly

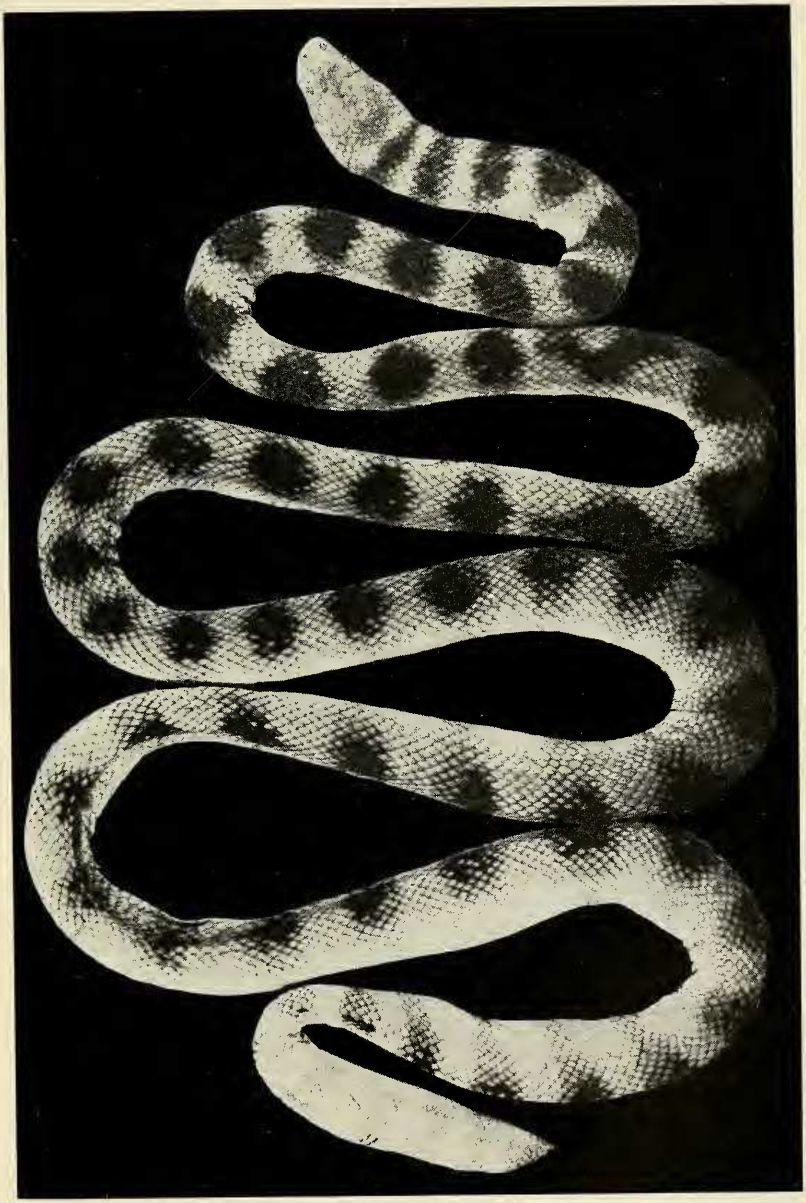

FIG. 112. *Hydrophis cyanocinctus* Daudin. No. 506 Songkhla, Songkhla province, southern Thailand. Actual total length, 1191 mm.; tail, 92 mm. Female with 62 bands on body and tail.

more evident posteriorly than anteriorly; seven bands on tail moderately distinct. Tail tip black. Head gray-olive with some yellowish olive on anterior head scales and labials; lower jaw with gray pigment.

Measurements in mm.: Total length, 1650; tail, 105; width of head, 20; length of head, 41.

Table of data on Thai specimens of *Hydrophis cyanocinctus*

NUMBER	696	698	506	289	578
Sex	♀	♀	♀	♀	♂
Total length (mm.)	1650	1479	1191	1045	972
Tail-length	105	110	82	69	95
Head-width	20	20	19	14	13
Head-length	40	36.5	25	24	24
Scalerows about neck	29	30	29	31	29
Scalerows about middle	39	39	38	37	39
Scalerows before vent	37	33	35	31	32
Ventrals	378	375	365	377	336
Subcaudals	45	41	38	44	46
Supralabials	8–8	7–7	8–8	8–9	8–8
Labials enter orbit	[3, 4, 5 [3, 4, 5	[3, 4, 5 [3, 4, 5	[3, 4 [3, 4	[3, 4, 5 [4, 5	[3, 4, 5 [3, 4, 5
Infralabials	10–10	10–10	10–10	8–9	9–9
Labials touch 1st chinshields	3–3	3–3	3–3	3–3	33
Black bands on body	66	72	55	59	54
Bands on tail	7	10	7	7	10

Variation: The table shows variation in a series of specimens from Songkhla. The ventral range (of all my specimens) is 336-404 both sexes; Malcolm Smith gives 290-390 as the known range for the species.

In No. 289, the light area on the head passes back above and behind the eye. The top of the head is gray from back of prefrontals to a point eight scales behind parietals. Anteriorly the spots are bluish with a small blackish center on the scales. Intervening areas with scales having hidden dark edges. The bands pass across venter but they are dim at a point on the sides.

Distribution: In Thailand the species is regarded as rather common along the coasts on the east side of the peninsula, especially those of the provinces of Songkhla and Pattani. It has been taken as far north as Bangkok and along the western coast of Trang.

Outside of Thailand it is known on the coast from the Persian Gulf to Japan and in the Indo-Australian Archipelago. The distribution, however, is not equal and in certain areas along the coasts it is quite unknown.

Hydrophis ornatus (Gray)

Aturia ornata Gray, Zoological Miscellany, 1842, p. 61 (type-locality unknown: M. Smith gives the type-locality as "Indian Ocean").

Two or possibly more subspecies of *ornatus* have been described, only a single one, the typical form is known from Thai waters.

Hydrophis ornatus ornatus (Gray)

Aturia ornata Gray, Zoological Miscellany, 1842, p. 61.

Distira ornata: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 290-291; Wall, Mem. Asiat. Soc. Bengal, vol. 2 (8), 1909, p. 232, figs. and pl. 9; Proc. Zool. Soc. London 1903, pp. 95, 101; *ibid.*, 1905, p. 517.

Hydrophis ornatus: Günther, The fauna of British India, 1864, pp. 376-377, pl. 25, fig. 5; de Rooij, The reptiles of the Indo-Australian Archipelago II, Ophidia 1917, p. 236; M. Smith, Monograph of the sea-snakes (Hydrophiidae) 1926, pp. 81-83, fig. 24; Bull. Raffles Mus., no. 3, 1930, p. 80; Tweedie, The snakes of Malaya, 1954, p. 108.

Hydrophis ornatus ornatus: M. Smith, The fauna of British India, Ceylon and Burma . . . vol. 3, Serpentes, 1943, pp. 460-461; Bourret, Les serpents marins de l'Indochine Francaise 1935, p. 42.

Hydrophis lamberti: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1917, p. 340 (type-locality, mouth Meklong River, Bight of Bangkok); Journ. Federated Malay States, vol. 10, 1920, pl. fig. A.

Diagnosis: Head large, body stout; ten to thirteen maxillary teeth following poison-fangs; one preocular, two or three postoculars; two superimposed anterior temporals; usually no small cuneate scales on oral margin between third and fourth infralabials. Pale grayish or olivaceous to pure white above with broad dark bars or rhomboidal spots separated by narrow interspaces; below yellowish or whitish; head olivaceous.

Description of species: Maxillary teeth ten to thirteen behind poison-fangs; head large, usually about one half of greatest diameter of body; diameter of eye at least equal to its distance from mouth; frontal as long as its distance from rostral or end of snout; one preocular, two or three postoculars; supralabials seven or eight, second normally in contact with prefrontal, third and fourth border orbit; two superimposed anterior temporals; three infralabials bordering first chinshields; anterior pair of chinshields well developed, in contact, posterior pair poorly developed and separated by scales; usually no small cuneate scales on oral margin between third and fourth infralabials.

Scalerows on neck in males, 28 to 37; females 31 to 45 about body, 33 to 45 in males; females 39 to 55; posterior scales more or less hexagonal in shape, as broad or broader than long, subimbricate or juxtaposed with a central tubercle or short keel;

ventrals, 209 to 260 in males; 236 to 312 in females, distinct throughout, twice as broad as adjacent scales anteriorly, narrower posteriorly; preanals feebly enlarged.

Color in life: Pale grayish or olivaceous; sometimes nearly white with broad dark bars or rhomboidal spots, separated by narrow interspaces; below yellowish or whitish; head olivaceous.

Measurements in mm.: Total length, male 950; tail, 115; female, total length, 750; tail, 80.

Variation: The cross-bars vary in number from 30 to 59. Those known from Thailand waters have 30 to 38 bars. The bars may terminate bluntly halfway down the sides or taper gradually or be continued as faint lines around the body. Rarely they are confluent forming on dorsum a nearly uniformly colored band, except anteriorly.

Some specimens have large rounded spots on flanks alternating with the dorsal cross-bars.

Distribution: The species is rare in the Gulf of Thailand, three specimens appear to be the only ones known. I have not found it.

Hydrophis caerulescens (Shaw)

(Fig. 113)

Hydrus caerulescens Shaw, General zoology, vol. 3, 1802, p. 561 (type-locality, Indian Ocean).

Enhydris caerulescens: Merrem, Tentamen systematis amphibiorum, 1820, p. 140.

Hydrophis caerulescens: Gray, Zoological miscellany, 1842, p. 62; Catalogue of the snakes in the collection of the British Museum, 1849, p. 55; Günther, The reptiles of British India, 1864, p. 365, pl. 25, fig. C; Theobald, Journ. Linn. Soc., vol. 10, 1868, p. 66; Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 275-276; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 187; Sclater, List of snakes in the Indian Museum, 1891, p. 62; M. Smith, Journ. Federated Malay States Mus., vol. 10, 1920, pp. 17-19, 46, 47; M. Smith, Journ. Nat. Hist. Soc. Siam. vol. 1, pt. 3, Mar., 1915, p. 214; M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 90-94, fig. 26; M. Smith, Bull. Raffles Mus., no. 3, 1930, pp. 80-81; Bourret, Les serpents marins Indochine Française, 1935, p. 38; Les serpents de l'Indochine, 1936, p. 357; Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 463-464; Tweedie, The snakes of Malaya, 1954, p. 108; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, pp. 1167-1168, fig. 35.

Disteira caerulescens: Wall, Mem. Asiat. Soc. Bengal, vol. 2, no. 8, 1909, p. 231.

Polyodontophis caerulescens: Prater, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 174.

Polyodontognathus caerulescens: Wall, Ophidia Taprobanica, or the snakes of Ceylon, 1921, pp. 375-380, fig. 71.

Hydrophis frontalis Jan, Elenco sist, ofid., 1863, p. 110 (type-locality, Océan des Grandes Indies); Jan and Sordelli, Iconographie générale des ophidiens, livr. 39, 1872, fig. 2; Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 276; de Rooij, Reptiles of the Indo-Australian Arch., vol. 2, Ophidia, 1917, p. 227.

Hydrophis hybrida Schlegel, Abbild. neuer. Amphib., 1844, p. 115, col. pl. 37; Jan and Sordelli, Iconographie générale des ophidiens, livr. 41, 1872, pl. 5; Boulenger, Catalogue of the snakes of the British Museum, 2nd Ed., vol. 3, 1896, p. 274; de Rooij, Reptiles of the Indo-Australian Archipelago, 1917, p. 233.

Hydrophis polyodontus Jan and Sordelli, Iconographie générale des ophidiens, livr. 41, 1872, pl. 1 (type-locality unknown); Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 274; de Rooij, Reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 233.

Hydrophis caerulescens thai M. Smith, Journ. Federated Malay States Mus., vol. 10, 1920, p. 18 (type-locality, Hua Hin, on Gulf of Siam).

Diagnosis: Medium length sea-snake with a moderately small head, body not especially slender anteriorly; a series of from 13-18 maxillary teeth of same size following poison-fangs, after a diastema; third and fourth supralabials border orbit; small scales at oral margin following third and fourth infralabials; scalerows on neck, 31 to 43; on body, 38 to 54, strongly keeled; ventrals somewhat enlarged, distinct. Head black with or without a curved yellow mark.

This sea-snake has the largest number of maxillary teeth in the recognized species of *Hydrophis.*

Description of species (from No. 327, Songkhla): Rostral wider than high, well visible from above; nasals large, broadly in contact with each other, narrowed posteriorly; nostril dorsal, with a suture running from nostril to second labial partly dividing scale; prefrontals somewhat angular posteriorly, smaller than frontal; frontal wider than supraoculars, as long as its distance from rostral, shorter than parietals; one preocular, one (two) postoculars, latter touching three (or two) anterior temporals and parietal. Supralabials, eight, second touching prefrontals, third and fourth bordering orbit, last four small; three anterior temporals, (on right side two), lowermost fused with lower postocular, touching eye border; infralabials, nine, first pair segmented transversely, leaving a pair of scales between them and first chinshields; three infralabials touching first chinshields; a small cuneate scale between third and fourth infralabials on oral border; last five infralabials small. All head scales with numerous fine tubercles.

Scalerows: At neck, 33; about widest part of body, 41; before vent, 32; scales keeled, the keels elevated posteriorly often ending in a short spine, longer dorsally, shorter and bituberculate and more spinous ventrally. Ventrals distinct, 322; subcaudals, 50.

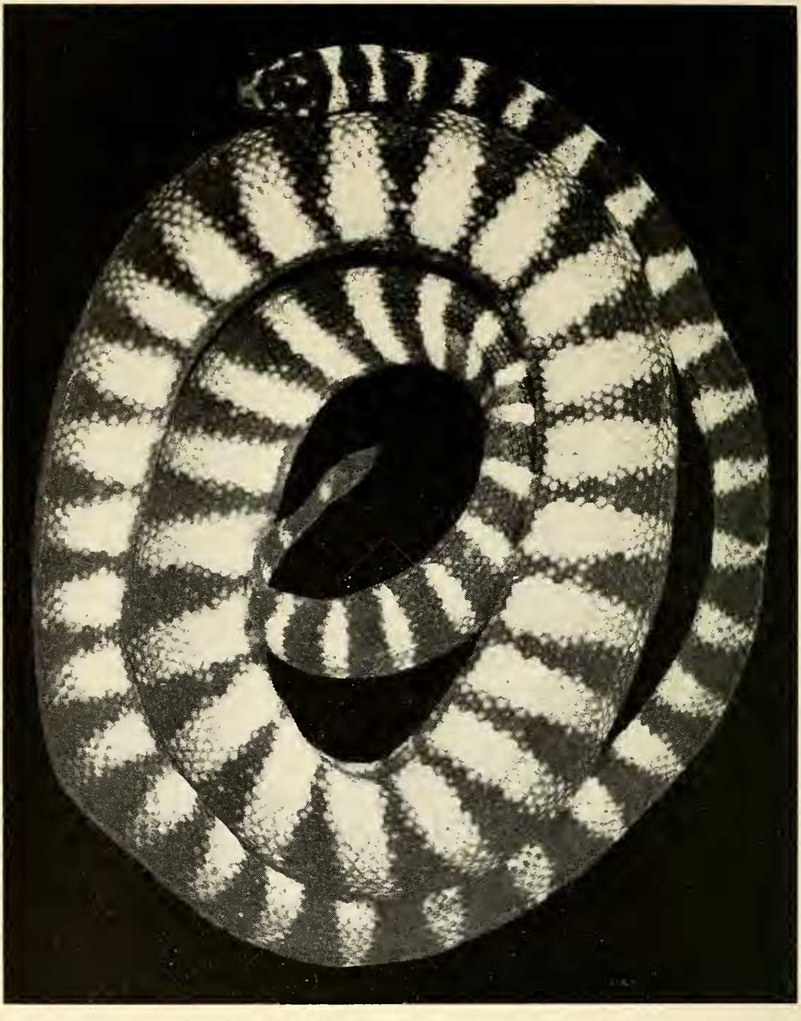

FIG. 113. *Hydrophis caerulescens var.* No. 34624, Sea of Singgora, near Phatthalung, Phatthalung province, southern Thailand. Actual total length, 901 mm.; tail, 119 mm. (from fresh water).

Color in life: Head black without trace of lighter markings; body somewhat grayish dorsally; remainder yellowish to dirty white; 50 bands on body, anteriorly as wide above as below; posteriorly wider dorsally and narrowing laterally; seven bands on tail.

Measurements in mm.: Total length, 712; tail, 78; width of head, 9; length of head, 16.

Variation: The number of small maxillary teeth varies between 13 and 18; the body has a diameter in the adult varying from two to three times the diameter of neck. The diameter of the eye is equal to or a little greater than its distance from the mouth. The temporal scales are especially variable seemingly caused in part by splitting of the fifth supralabial and occasional fusion of the sixth or seventh with a temporal.

The scales at times seem to be subimbricate and frequently the posterior scales are truncate and juxtaposed.

The number of bands varies from about 40 to 54. In very old specimens the spots are so indistinct as to be scarcely recognizable. Maximum length is probably less than 850 mm.

Distribution: In the Gulf of Siam the species is common along the Thai coasts, and most probably also occurs on the west coast (Bay of Bengal). Elsewhere the species is widespread.

Malcolm Smith (1920) named this form found in Siamese waters, *H. caerulescens thai,* characterized by having an average of 292 ventrals, the neck scales, 31-37; the body scales, 38-49; the parietals usually in contact with the postocular. In his later works Smith (1926-1943) synonymized the form, presumably the overlap of the scale counts left but little to differentiate the form in the Gulf of Siam from the typical form occurring in the Straits of Malacca and the shores of India and Burma. I have followed him in this treatment of the name.

The specimen figured, from the Sea of Singgora, differs in having more bands and is larger than usual. (901 mm.).

Hydrophis torquatus Günther

Hydrophis torquatus Günther, Reptiles of British India 1864, p. 369, pl. 25 (type-locality, Penang).

In his work on the sea-snakes, Malcolm Smith recognized three subspecies of *torquatus* concerning which he states, —"Three forms can be distinguished, varying slightly from one another in scalation and coloration."

Two of these, *t. aagaardi* and *t. diadema,* occur on the west coast of the Malay Peninsula in the Gulf of Siam. While the typical form occurs on the Bay of Bengal side of Malaya only a little below the Thai border, it almost certainly occurs on the west coast of peninsular Thailand.

These forms may be differentiated by the following key:

KEY TO THAI SUBSPECIES OF *Hydrophis torquatus*

1. 33-37 scalerows on neck; 43 to 49 on body; ventrals 242-306 (average 278). Head in adult pale gray with a suffusion of yellow above. Bay of Bengal, straights of Malacca . . . . *torquatus torquatus*

2. 31-37 scalerows on neck; 39-47 on body. Ventrals 276-325 average 297. Head in adult blackish to dark olive with yellow marks across snout and along the sides above and behind eye. . . . . *H. t. aagaardi*
3. 29-35 scalerows on neck; 35 to 42 on body; ventrals 271-343 (average 301). Head markings the same. . . . . *H. t. diadema*

Hydrophis torquatus diadema Günther

Hydrophis diadema Günther, Reptiles of British India, 1864, p. 373, pl. 25, fig. 5 (type-locality unknown); Peters, Monatsb. Akad. Wiss. Berlin, 1872, p. 895; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 188; de Rooij, The reptiles of the Indo-Australian Archipelago, 1917, pp. 229-230.

Hydrophis obscurus: Flower, Proc. Zool. Soc. London, 1899, p. 687 (not of Daudin).

Hydrophis tuberculatus: M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 1, 1915, pp. 214, 247 (not of Anderson).

Hydrophis siamensis: M. Smith, Journ. Nat. Hist. Soc. Siam. vol. 2, 1917, pp. 341-342 (type-locality, mouth of the "Chantaburi" River, Gulf of Siam); Journ. Bombay Nat. Hist. Soc. vol. 26, 1919, p. 682.

Hydrophis torquatus siamensis: M. Smith, Journ. Federated Malay States Mus., vol. 1, 1920, pp. 15-17, 43-44.

Hydrophis cyanocinctus: Wall, Journ. Bombay Nat. Hist. Soc., vol. 25, 1918, p. 754, fig. (not of Daudin).

Hydrophis torquatus diadema: M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 79-81; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes 1943, p. 460; Bourret, Les serpents marins de l'Indochine Française, 1935, p. 39; Les serpents de l'Indochine 1936, p. 359.

Diagnosis: A species with a medium-large head; elongate body moderately slender anteriorly, compressed posteriorly. Head black or dark olive with yellow markings on snout and along sides of dorsal part of head; variable temporal formula; neck scalerows, 29-35, body rows, 35-42(51); ventrals, 271-343, distinct throughout; most specimens completely banded.

Description of species (from M. Smith 1926): This form differs from the typical form and from *aagaardi* in having fewer scalerows on neck (29 to 35, [usually 31-33]); 35 to 42 (usually 37 to 39 on the body); ventrals 271 to 343 (average for 84 specimens 301).

Color: Head black, the yellow markings usually more diffuse, in some specimens in excess of the ground-color. Most specimens are completely banded. The character of temporals is unstable, usually one, there may be two to four on one or both sides.

Measurements in mm.: Largest male, total length, 895; tail, 115; largest female, 1045, tail, 105.

Distribution: "From Meklong on the west side of the Gulf of Siam to Koh Chang (island) on the east." It is particularly abundant at the mouths of the Meklong and Chanthaburi rivers.

Hydrophis torquatus aagaardi Günther

(Fig. 114)

Hydrophis torquatus aagaardi M. Smith, Journ. Federated Malay States Mus., vol. 10, pt. 1, July 1920, pp. 13, 14-15 (type-locality, coast of "Bangnara, Pattani" [= Narathiwat, Narathiwat] Gulf of Siam). I have retained this form as a legitimate subspecies despite the fact that specimens from Songkhla at the mouth of the Sea of Singgora, vary somewhat from specimens from farther south at Narathiwat, the type-locality.)

Diagnosis: (see key).

Description of species (from No. 340, Songkhla): Head moderately large, twice as long as wide, neck and anterior part of body not especially slender. Rostral approximately one-fourth wider than high, well visible above; nasals large, mesially in contact, extending noticeably behind level of nostrils, partially divided by a suture from nostril to second labial; prefrontals touching second labial; frontal pointed behind, its length equal to its distance from rostral, shorter than parietals; one preocular, one postocular; two anterior temporals, upper very much the larger; this followed by a large secondary temporal on one side, (one and one on the other); supralabials eight, second largest, third and fourth bordering orbit, last four small; supraoculars only a little narrower than frontal; infralabials ten, first four large, three bordering first pair of chinshields which are equal or nearly equal to second pair; two small cuneate scales on oral border between second and fourth infralabials; eight rows of small scales between chinshields and first ventrals.

Scalerows about neck, 39; about widest part of body, 40; before vent, 32; scales keeled or with two tubercles, usually a larger one followed by a smaller one; scales on neck imbricate, pointed posteriorly, bluntly truncate, subimbricate or juxtaposed. Ventrals, 312; subcaudals, 59; lateral anal scales much enlarged, separated by a somewhat smaller median pair, anteriorly bearing two larger tubercles followed by a pair of small tubercles. Ventrals distinct throughout; toward posterior part of body there are two or three short groups of divided ventrals. Hemipenes black.

Color: Body somewhat yellowish with a series of 52 dark-olive bands on body and ten on tail; bars anteriorly completely surrounding body, posteriorly they cannot be traced across venter except those near vent; dorsally separated by dark olive only a little less dark than bands, growing yellowish and (posteriorly) wider on venter; many scales have blackish centers, while lower on sides the yellowish scales are somewhat darker on edges. Head dark;

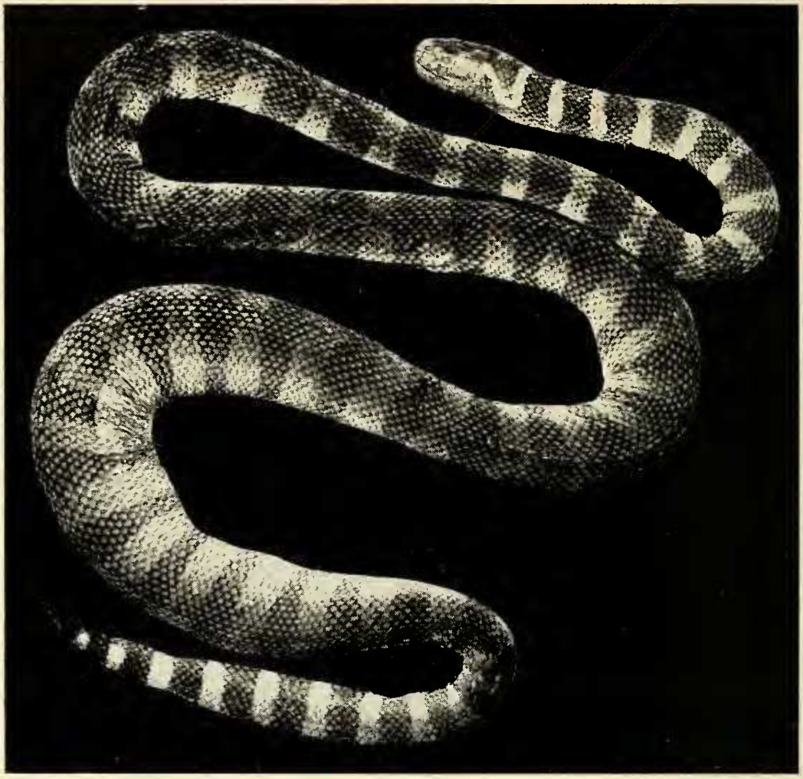

FIG. 114. *Hydrophis torquatus aagaardi* M. Smith. No. 322 ♀, Songkhla, Songkhla province, southern Thailand. Actual total length, 848 mm.; tail, 107 mm.

diffuse yellowish bars surrounding tail, distinctly wider than interspaces. Markings on snout and sides of head; two oval dark-centered spots on each side of nape; infralabials and chinshields gray.

Measurements in mm.: Total length, 1053; tail, 135; greatest depth of tail, 17; depth of body, 21; width of head, 13; length of head, 26; depth of neck, 13.

Variation: The lower anterior temporal is very much smaller than the upper which lies somewhat posterior to the first. The large secondary temporal may be segmented by a vertical suture or it may break into several pieces. Occasionally there is a second postocular, presumably formed by the segmentation of the posterior portion of the fourth supralabial.

The maxillary teeth are found to vary between 9-11, ten appearing six times in eleven specimens.

Measurements in mm., and data on *Hydrophis torquatus aagaardii*

Number	374	380	340	341	342	321	322	373	296	480	557
Sex	♂	♀	♂	♀	♀	♀	♀	......	♀	......	♂
Total length	975	827	1053	802	927	827	848	681	637	605	805
Tail	126	95	135	97	105	94	107	80	68	78	100
Neck, scalerows	40	36	39	37	37	36	40	37	36	37	39
Body, scalerows	41	41	40	41	39	42	43	39	41	42	41
Supralabials	8–8	7–7	8–8	8–7	7–7	7–7	8–8	8–8	7–8	7–7	7–7
Infralabials	10–10	10–10	11–11	10–11	10–10	10–10	9–9	9–9	10–10	9–9	11–10
Temporals	2+2	2+1	2+2	2+2	1+2	2+2	2+2	2+2	2+2	2+2	2+2
Ventrals	329	306	312	306	305	316	286	313	319	286	293
Subcaudals	60	52	59	47	54	53	52	50	51	54	52
Body-bands	56	52	52	52	54	54	50	49	44	54	52
Tail-bands	10	6+	10	10	9	10	9	9	7	10	10
Maxillary teeth	9	10	11	11	10	10	9	9	10	10	10

The bands on the body vary from (44) 49-56, 52 being the most frequent number; on the tail ten is the most frequent number of bands; however when smaller numbers are present the terminal black portion is proportionally wider.

Remarks: The specimens from Songkhla fail to fit the averages given by M. Smith. Unfortunately the sample consists of only ten specimens, while Smith's own series was 44. He states: "All the specimens were taken in deep, clear sea-water, being caught in trawling nets, some as far as 20 miles from the coast." My series were taken largely in the sea of Singgora or at varying distances from the mouth.

The average number of ventrals in *aagaardi* is given by Smith as 297, while my Songkhla series has an average of 306 (the total variation being 286 to 339); the scales on the neck in Songkhla specimens vary between 36 and 40, the average being 37.7; scales around body vary between 39 and 42; average 41. These may be compared with *aagaardi* with the scales on neck usually being 33 to 35, and on body 42 to 45.

It is entirely possible that a larger sample from Songkhla would show a greater correlation with the type series.

While there is a strong possibility that the typical form, *torquatus torquatus* occurs on the western coast of peninsular Thailand, the type-locality being at Penang Island, I have not included a description.

Hydrophis klossi Boulenger

(Figs. 115, 115a, 116)

Hydrophis klossi Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 190 (type-locality, Thuala, Selangor, Malaya); Smith, Journ. Bombay Nat. Hist. Soc., vol. 23, 1915, p. 787; Journ. Federated Malay States Mus., vol. 10, 1920, p. 19, pl. figs. B; Bull. Raffles Mus., no. 3, 1930, p. 78 ("Gulf of Siam as far south as Pattani"); Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 68-70, fig. 21 (Bangkok, Bay of Pattani, Songkhla); Tweedie, The snakes of Malaya, 1954, pp. 106-107.

Hydrophis nigrocinctus: Laidlaw, Proc. Zool. Soc. London, 1901, p. 579 (*part.*) (not of Daudin); Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, p. 187.

Diagnosis: A medium-sized sea-snake (1300 mm.) with a small head and anterior part of body long and slender, enlarged and slightly compressed posteriorly; snout somewhat projecting; scales distinctly imbricate throughout neck, body and tail; ventrals distinct, not divided; body with 50 to 75 (usually 60 to 70) black bands; intervening color gray, green, or ivory-white. Head black in young, becoming lighter in older specimens, often with a narrow semicircular mark on back of head.

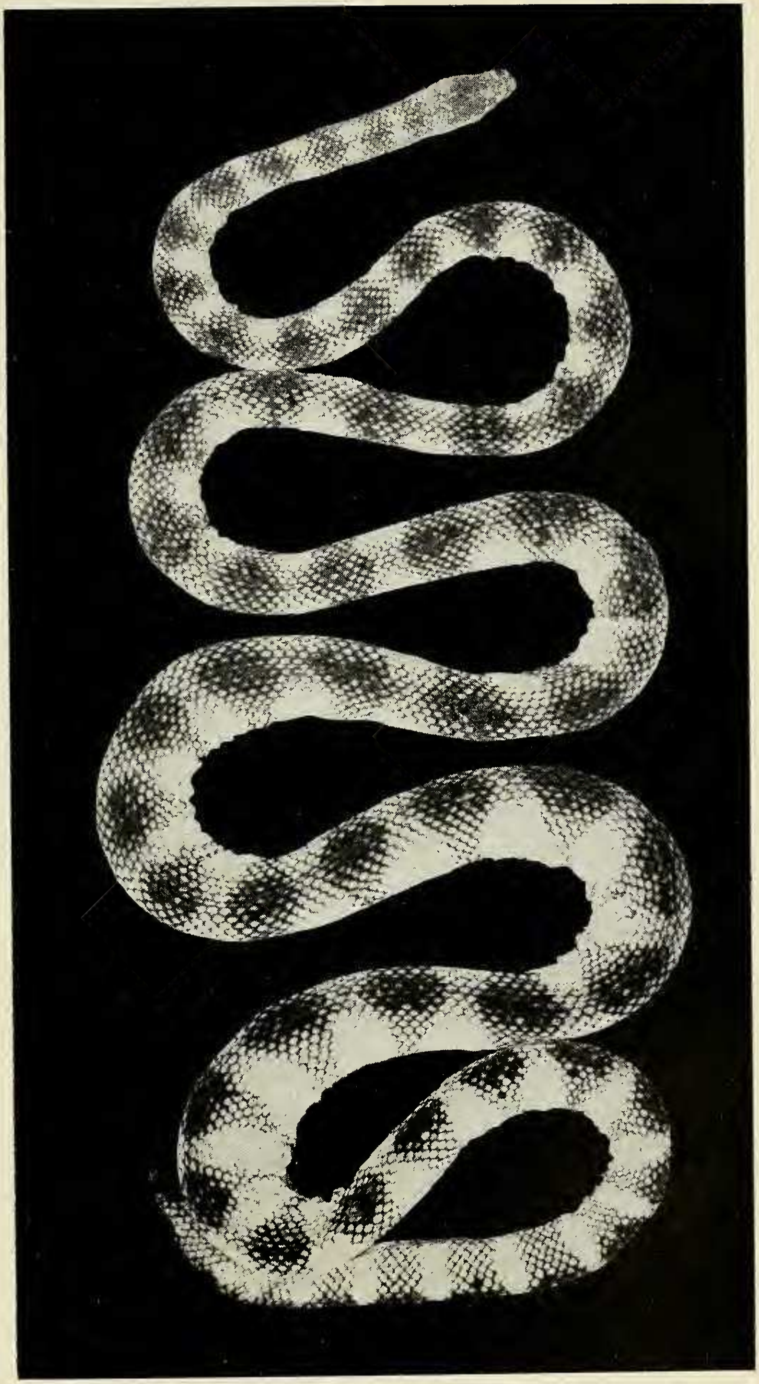

FIG. 115. *Hydrophis klossi* Boulenger. No. 35570 Songkhla, Thailand.
Actual total length, 817 mm.

Description of species (from No. 504, Songkhla, peninsular Thailand): Head very small, snout projecting; neck and anterior part of body slender, head not distinct from body; posterior part of body two and one-half to three times diameter of neck; five or six maxillary teeth behind poison-fangs. Rostral as high as wide, angular posteriorly, narrowly visible from above; nasals elongate, broadly in contact with each other, nostril in outer posterior portion, with a suture running from nostril to second supralabial; (the rim of nostril broken on left side abnormally); prefrontals relatively very large, much more than half size of nasals, and four fifths of area of frontal; frontal slightly longer than wide, its length equal to its distance from middle of nasals, much shorter than parietals, only slightly wider than large supraoculars; one preocular and one postocular; one very large anterior temporal followed by (left side) one large elongate temporal, on (right side) second divided vertically in two; five supralabials, second largest, touching prefrontal, third and fourth border orbit; fifth touching postocular; five large and two small infralabials, first three touching first chinshields; second pair of chinshields well developed, separated by a scale touching two labials; first pair of infralabials nearly as long as both pairs of chinshields; nine scalerows between second chinshields and first widened ventral.

Scalerows: 23 (24) scales about neck; 33 at widest part of body, 32 before vent; ventrals only about a half larger than adjoining scales and bearing two distinct keels; other scales with one keel about half length of scale, keels absent or dim on neck; scales on sides above anal region smooth; caudal scales keeled. Ventrals, 391; subcaudals, 57; outer pair of anals moderately large, median pair about same size with two small intercalated scales.

Color in life: Dorsally gray, edges of scales darker on middle fifteen dorsal rows; below on sides and venter, yellowish to ivory-white. Head dark above, lighter on snout and anterior nasals. A whitish temporal spot and a semicircular row of white dots on occiput; chin and underside of head dirty yellowish clouded with darker; a black bar on nape, convex anteriorly. Neck and anterior part of body black with yellowish bars reaching ventral surface narrower than black bars; from here posteriorly, body with black and light bands. Total yellow bands, 65, anteriorly incomplete, and an equal number of bluish bands wider dorsally, narrower ventrally.

Measurements in mm.: Total length, 785; tail, 74; width of head, 6.8; length of head, 12.6.

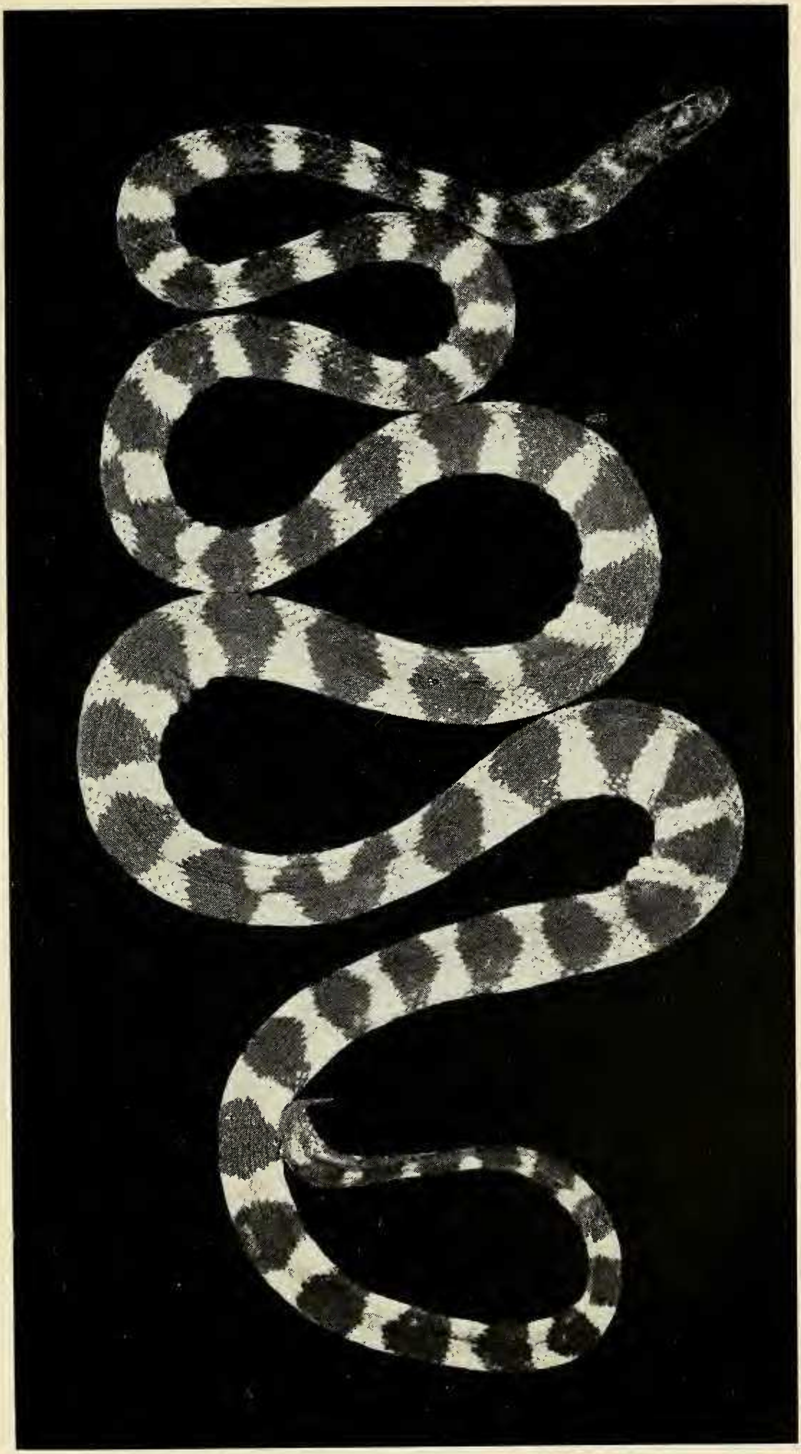

Fig. 115a. *Hydrophis klossi* Boulenger. No. 34628, young, Songkhla, Songkhla province, southern Thailand. Actual total length, 690 mm.; tail, 64 mm.

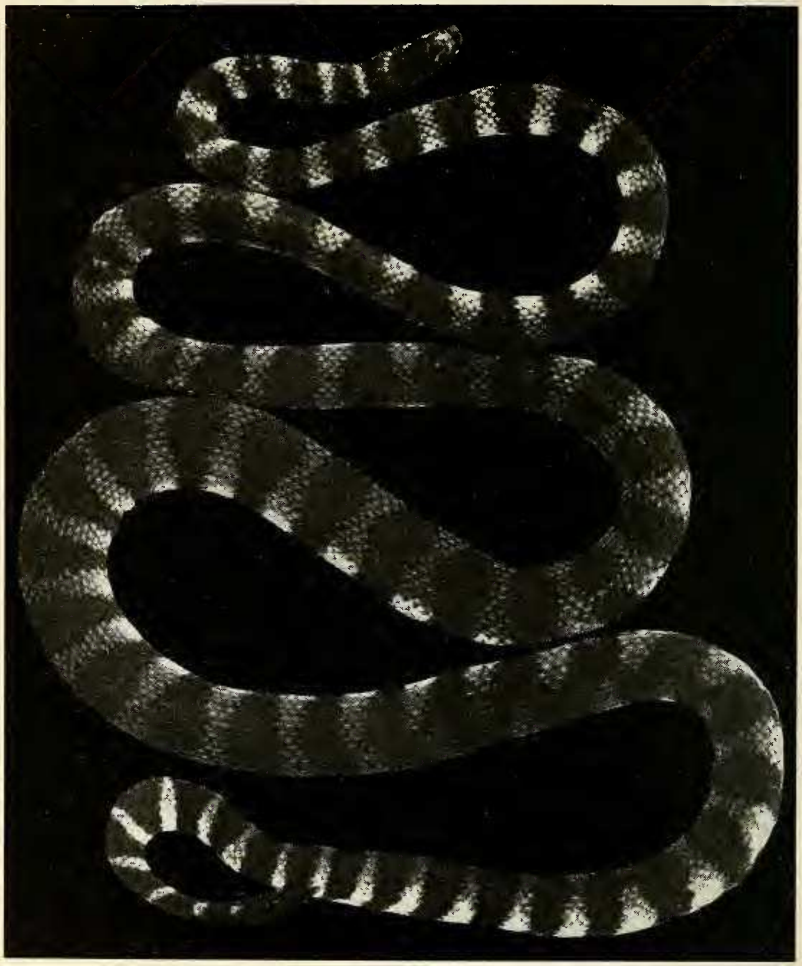

FIG. 116. *Hydrophis klossi* Boulenger. No. 1720, Songkhla, Songkhla province. Actual total length, 770 mm.; tail, 71 mm.

Variation: I am referring a young specimen (No. 532 Songkhla) to this species. It differs as follows: Head and body are black for more than one third of its length. About 20 mm. back from head a series of very small paired light spots appear on the sides and continue, later joining on the middorsal line, forming 54 pairs or bars. At number 21 the white color reaches to ventrals which are black, the black bars completely surrounding body; the following 14 black bands fail by several scalerows from reaching the ventrals; the last four black bands however, do encircle the body. There are four pairs of yellowish spots on the tail. There are 23 scalerows about neck, 33 at widest part of body. The ventrals are 397, subcaudals, 51. The outer anal scales are much enlarged and separated by four small scales.

The known variation in ventral scales in specimens from Thailand is from 360 to 430 the average numbering approximately 390. There is seemingly no significant sexual difference where counts of the sexes are averaged separately.

There are rarely six labials present, the sixth being very small. The number of bands vary from 50 to 75. The light mark on occiput may be absent.

Remarks: The species is known along the east coast of peninsular Thailand as far south as Pattani. It is known also on the west coast of northern Malaya (Perak and Selangor).

Both males and females reach a length of more than one meter. The largest specimen listed by M. Smith, 1943, is a female with a total length of 1300 mm., the tail 100 mm.

This snake when young looks much like *Microcephalophis gracilis.* The characters that may be used to differentiate them are the imbricating scales of *H. klossi,* and the divided ventrals, each part with three keels, of *M. gracilis.*

Hydrophis fasciatus (Schneider)

Hydrus fasciatus Schneider, Historiae amphibiorum naturalis et literariae, fasc. primus . . . 1799, pp. 240-241 (type-locality, East Indies); M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 94-99.

Dr. Malcolm Smith recognizes two subspecies of *fasciatus,* those west of the Malay peninsula being regarded as the typical *f. fasciatus,* while to those east of the peninsula the name *f. atriceps* Günther is applied.

These two forms may be differentiated by the following key:

KEY TO SUBSPECIES OF *Hydrophis fasciatus*

1. About neck 27 to 33 scalerows; about body, 47 to 58; ventrals 414 to 514 (average 460) . . . . *fasciatus fasciatus*
2. About neck 25 to 31 (usually 27 to 29); about body, 39 to 49 (usually 43 to 45); ventrals 323 to 453 (average 366 or less) . . . . *fasciatus atriceps*

Only *atriceps* has been taken in Thai waters. However little collecting has been done on the coast of the Bay of Bengal, and *f. fasciatus* may be found there.

Hydrophis fasciatus atriceps Günther

(Fig. 117)

Hydrophis atriceps Günther, Reptiles of British India, 1864, p. 371, pl. 25, fig. 1 (type-locality, "Siam").

Disteira fasciata: Boettger, Katalog der Reptilien-Sammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft, Teil II Schlangen, 198, p. 113 (Manila).

Hydrophis fasciatus: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 281 (*part.*); de Rooij, Reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 230; Roux, Abh. Senckenberg. Nat. Ges., Frankfurt, vol. 33, 1910, p. 221.

Hydrophis alcocki Wall, Mem. Asiat. Soc. Bengal, vol. 1, 1906, p. 288, fig. (type-locality, Puri, Orissa, India).

Disteira cincinnatii Van Denburgh and Thompson, Proc. California Acad. Sci., vol. 3, 1908, p. 41, pl. (type-locality, Philippines); Taylor, The snakes of the Philippine Islands, 1922, p. 239, fig.

Hydrophis fasciatus atriceps: M. Smith, Journ. Federated States Mus., vol. 10, 1920, p. 25; Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 97-99, fig. 27; Bull. Raffles Mus., no. 3, 1930, p. 82; Tweedie, Snakes of Malaya, 1954, p. 110.

Diagnosis: Snakes with small heads; bodies slender anteriorly, larger and compressed posteriorly; five to six maxillary teeth behind poison-fangs; head black, chin black followed by a black stripe along neck and anterior part of body, joining first eight to 20 black bars; body cream, banded in black; anterior bands wider than interspaces; one anterior temporal followed by one scale or latter may be divided vertically.

Description of species (from No. 584, Songkhla): Head very small, anterior part of body slender but gradually becoming larger and compressed; rostral distinctly wider than high, well visible above; nasals large, broadly in contact, nostril pierced very close to outer posterior part of scale with a very short suture to second labial from nostril; prefrontals wider than long, touching second labial below level of nostril; frontal elongate, its length equal to its distance from rostral, shorter than parietals; three scales between temporals behind parietals; one preocular; one postocular touching fifth labial, anterior temporal, and parietal; anterior temporal large, followed by a secondary temporal equally as large or a little smaller; supralabials six, second largest, last smallest, third and fourth border orbit; seven or eight infralabials, first three bordering first chinshield; fourth largest; a small intercalated cuneate scale between third and fourth infralabials on oral border; chinshields well developed, second pair longest, in contact, as is the first pair.

Scalerows: 28 on neck, 40 widest part of body, 36 before vent; scales imbricate anteriorly, subimbricate, to nearly juxtaposed pos-

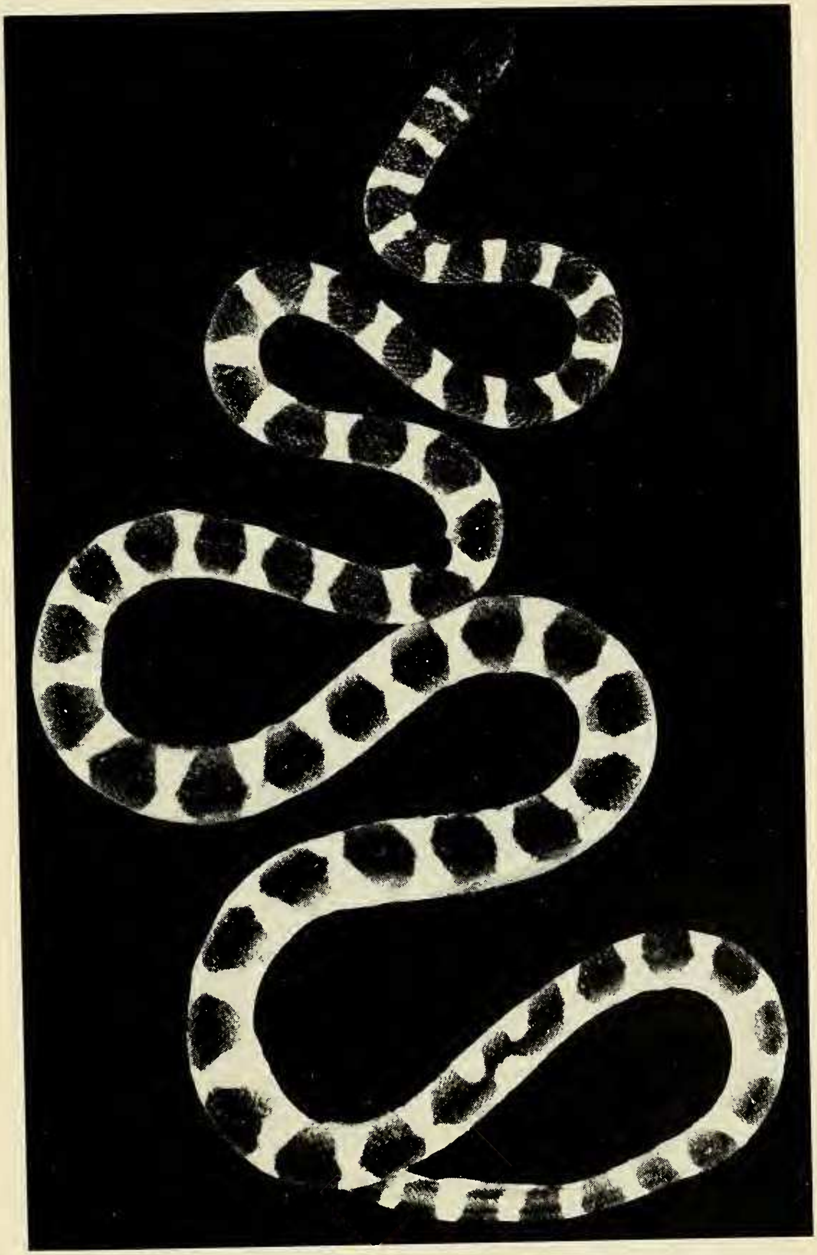

FIG. 117. *Hydrophis fasciatus atriceps* M. Smith. No. 1921, Songkhla, Songkhla province, southern Thailand. Somewhat enlarged.

teriorly; many scales truncate posteriorly; most scales with a median tubercle. Ventrals 409, subcaudals 53, anal scales much enlarged, separated by a pair of smaller scales; each ventral with two small tubercles.

Color in life: Head black with a tiny yellow spot behind eye; on chin and for a short distance on anterior part of body, a black stripe narrowing posteriorly; body black-olive and greenish white to cream, the colors forming bands; 56 black bands narrowing laterally becoming obsolete on venter, separated on mid-line by narrow lighter bars, first eight or ten joining ventral stripe; nine bars on tail.

Measurements in mm.: Total length, 843; tail, 80; width of head, 6; length of head, 11.8.

Variation: Malcolm Smith's series of *atriceps* from Thailand were taken largely from coasts bordering the northern part of the Gulf of Siam. They vary considerably from a southern series which I took at Songkhla containing about an equal number of males and females.

The ventral counts for the typical *fasciatus* is given as 414-514 with an average of 460; for *atriceps*, 323-453, an average of about 366. Thus there is a presumed average difference of 94 ventrals. My series of 17 specimens from Songkhla show a maximum variation in ventrals from 380 to 441, or 61 scales. This is surprisingly different from that reported for the specimens from the northern coast—a difference of 40 scales.

The known range of scalerows on neck is from 25 to 31, for the body, 39 to 49. In the Songkhla series, the range varies from 27 to 31; and 41 to 48. The bands on the body are known to vary between 50 and 75; while in the Songkhla series they are 52 to 67, the average being 59. The bands on the tail vary between 6 and 11, the usual number for males being 9, for females 7. The anterior temporal frequently fuses with the last labial thus bordering on the mouth, while the second temporal is occasionally divided by a vertical suture.

The form reaches a length of one meter.

Distribution: The subspecies is probably present everywhere along the coastline of Thailand bordering on the Gulf of Siam. Elsewhere the species occurs in the Philippines, the coast of Cochin China, Sumatra, Java, New Guinea and perhaps Australia. Occasional specimens have been reported from Rangoon and Orissa (*fide.* Malcolm Smith).

Hydrophis brookei Günther

Hydrophis brookei Günther, Proc. Zool. Soc. London, 1872, p. 597 (type-locality, Sarawak, Borneo); Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 282-283; de Rooij, Reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, p. 230; M. Smith, Monograph of the sea-snakes (Hydrophiidae), 1926, pp. 99-101; Bourret, Les serpents marins de l'Indochine Française, 1935, p. 48; Les serpents de l'Indochine, 1936, p. 367; M. Smith, Bull. Raffles Mus., no. 3, 1930, pp. 82-83; Tweedie, The snakes of Malaya, 1954, pp. 109-110.

Disteira fasciata (*part.*): Wall, Mem. Asiat. Soc. Bengal, vol. 2, no. 8, 1909, p. 205, fig.

Hydrophis consobrinus M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1917, p. 341 (type-locality, Gulf of Siam, mouth of Bangpakong River); Journ. Federated Malay States Mus., vol. 10, 1920, pp. 20-22, 49-51, pl., fig. C.

Diagnosis: A sea serpent reaching somewhat more than one meter in length; head very small, as is the neck and anterior part of body; body much compressed posteriorly, its greatest diameter two and a half to three times diameter of neck. Posterior scales subimbricate and hexagonal in shape. Grayish above, yellowish white below; 60 to 80 blackish bands encircle body and tail, anteriorly of nearly even width above and below, twice as broad as interspaces and narrowing on sides posteriorly; head black with a yellow band across snout and along sides of head.

Description of species (from No. 377, Songkhla): Head very small, anterior part of body very slender; rostral wider than high, slightly visible from above; nasals subrectangular, broadly in contact; prefrontals somewhat diagonal much wider than long, broadly in contact with second supralabial; frontal much wider than supraoculars, about as long as its distance from rostral, shorter than parietals; parietals notched laterally by a suture (anomalous?); one preocular; one postocular touching parietal, temporal and two supralabials; a large anterior temporal, its lower point scarcely separated from labial border; second temporal divided by a vertical suture; four scales behind parietals between the two posterior temporals. Supralabials six, third and fourth border orbit; diameter of eye a little greater than its distance from mouth; infralabials seven or eight, first four large, others small; three scales border first pair of chinshields which are subquadrangular, about as wide as long, in contact; second pair of chinshields longer than first, pointed behind, in contact with each other anteriorly; five scalerows between these and first ventral; a small cuneate scale on labial border between third and fourth infralabials.

Scalerows: 32 about neck, imbricate, keeled, pointed behind; 38 at widest part of body; 33 before vent; posterior scalerows subimbricate or almost juxtaposed, scales truncate posteriorly; dorsally, keels ending posteriorly in a small spine; laterally and ventrally with a tubercle, which is sometimes spinous. Ventrals, 372 distinct, double or nearly double width of adjoining scales, bituberculate or with two or three accessory posterior smaller tubercles; outer preanals large, separated by a smaller median pair; subcaudals, 57.

Color in life: Above generally slate-gray, with yellowish white on venter; head dark with lighter marks on head above eye; a series of 64 bars on body fairly distinct anteriorly, surrounding body, first 24 about as wide above as on venter, a little wider than intervening spaces; posteriorly narrowed laterally and not passing across venter except four preceding vent; ten bands on tail; a broken median ventral blackish line throughout latter half of body.

Measurements in mm.: Total length, 965; tail, 96; width of head, 6; length of head, 12.5; greatest depth of body 26; diameter of neck, 6.

Variation: Variation in coloration between the young and adults is marked. In young specimens the head is dark with yellowish marks on nasals and prefrontals, and two indefinite yellowish marks along the sides of head above eye, and on temporals. In specimens measuring 600 mm. or more the bands are very distinct but those in the latter half of the body do not cross the venter. Many lack the blackish ventral line. The head, in a specimen of this length is 5 mm. wide and 10.5 mm. in length.

Variation in the number of scalerows is between 25 and 31 on neck, 37 to 45 on body. Thai specimens usually have 25 to 28 on neck; 37 to 42 on body; the variation in ventrals is 358 to 414, the average being about 375.

Distribution: The species is common in the Gulf of Siam, especially so at Songkhla, where a series of 42 were taken. It is known also on the western side of Thailand on the coast of Trang province. Elsewhere it is known on the coasts of Cochin China and northern Borneo and Java.

It is difficult sometimes to separate this species from *Hydrophis fasciatus fasciatus* and *fasciatus atriceps,* the latter occurring with *brookei* in the Gulf of Siam.

[*Hydrophis mamillaris*] Daudin

(Fig. 118)

Hydrophis mamillaris Daudin, Histoire naturelle générale et particulière des reptiles, vol. 7, 1803, pp. 340-342; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, Dec., 1943, pp. 462-463; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, Mar., 1958, pp. 1164-1166, fig. 34 (Bangphu, Bangkok).

Diagnosis: Eight to ten maxillary teeth behind the enlarged grooved fangs; head small, body slender anteriorly, seven supralabials, a small cuneate scale on oval margin; 25 to 29 scalerows around neck; 35 to 43 around body; ventrals 302-390, bicarinate.

Description of species (KUMNH No. 33517): Rostral well visible above; nasals large, elongate, in contact mesially; nostrils dorsal; prefrontals much wider than long, in contact laterally with the large second labial; frontal about as long as its distance from rostral; shorter than parietals; preocular 1 (2); one postocular; seven supralabials, the fourth enters orbit, last three small; infralabials 10-10, three touching first chinshield the second and third separated from lip by two (three) small cuneate scales; posterior infralabials small; a single large anterior temporal followed by a still larger temporal scale; latter followed by a third large temporal bordering parietal; four small postparietals.

Scale-formula: 36 (occiput), 33, 39, 32; ventrals about 325, not double width of adjoining scales. Two much enlarged preanals separated by two and a half pairs of scales, the last pair mesial and extending somewhat behind the enlarged scales.

Head and neck about one third greatest diameter of body. Ten maxillary teeth following the larger grooved fangs.

Color: Head black with a yellowish streak on each side behind eye; body blackish with 55 dark bands on body, and seven on flattened tail, wider dorsally narrowing posteriorly on sides, except for first eight, while bands encircle body or fail to meet below by a very narrow margin. Dorsal and upper lateral scales of light bands may have considerable pigment forming indefinite darker spots on some scales; most dorsal scales with keels or tubercles, especially posteriorly the keels are tuberculate; scales of median dorsal row often with two tubercles, one behind the other; while ventrals may have two lateral tubercles.

Remarks: Taylor and Elbel (*loc. cit.*) referred this specimen to this species in 1958 with considerable hesitation and I am uncertain still as to whether it is a somewhat aberrant *mamillaris,* or an aberrant specimen of some other form or perhaps a totally separate form.

Superficially it resembles *brookei* but the teeth are twice the number known in that form. The temporal scales resemble those of *brookei* but there are more supralabials, 7 instead of 5 or 6; there

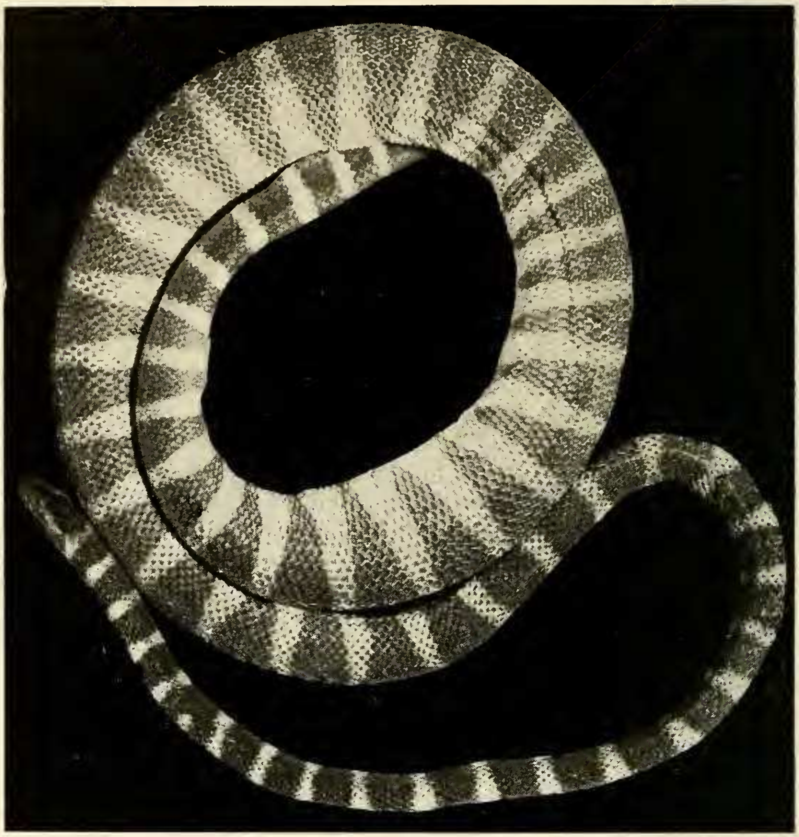

FIG. 118. *Hydrophis mamillaris* (Daudin). KUMNH No. 33517, Bangphu, Bangkok (about natural size).

are more scalerows on neck, 33 instead of 25-31 in *brookei*. There is a single labial entering orbit, two in *brookei*.

It has been compared with *fasciatus* but the differences are about the same—there being only five or six small maxillary teeth in this form.

When compared with *caerulescens* the head is much too small, the body too slender anteriorly, and the number of teeth too small (14 to 18 in *caerulescens*).

Until a series of specimens is available from this locality (Bangphu, Bangkok) the proper disposition of this specimen will remain in doubt. Not included in key.

Family VIPERIDAE Boie

Viperidae Boie, Isis, 1827, p. 511.

Diagnosis: Maxillary bone vertically elongated bearing only a large tubular poison-fang on its posterior part. Hypapophyses present throughout the vertebral column.

Only a single genus *Vipera* of this family is known to enter Thailand and even this has only a very limited distribution.

Genus *Vipera* Laurenti

Vipera Laurenti, Synopsis reptilium, 1768, p. 99 (type of genus, *redi* = *aspis*).
Daboia Gray, Zoological miscellany, 1842, p. 69 (type of genus, *pulchella* = *russellii*).

Diagnosis: Head distinct from neck, the top covered with small scales, without enlarged frontal or parietals; eye with a vertical pupil; a very large nostril pierced in a rather large lateral nasal shield; a nasorostral shield between nasal and rostral, or partially united with the nasal. Scales in 19-33 rows around body; ventrals rounded, tail short.

The genus is confined to Europe, Africa, Asia, and the Indo-Australian Archipelago.

Vipera russellii (Shaw)

(Fig. 119)

Coluber russellii Shaw, Naturalists miscellany, vol. 8, 1797, pl. 291 (Based on a figure in Russell's Indian serpents [Katuka Rekula Puda], p. 10, pl. 7) (type-locality, by inference, Coromandel Coast).

Several subspecies have been recognized by various authors, *russellii siamensis* being the only representative known in Thailand.

Vipera russellii siamensis M. Smith

Vipera russellii siamensis M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 482-485, fig. 153.

Diagnosis: A large species reaching approximately one and a half meters in length; similar to *russellii rusellii,* but differing in details in markings on head. An additional series of small elongate black spots present between the dorsal and lateral series, and small irregular spots along the flanks.

Description of subspecies: Snout bluntly rounded in profile; nostril very large; the diameter of eye about equal to distance of eye from nostril, less than its distance to mouth; rostral small, not visible from above; a nasorostral scale between rostral and nasal, partly united with nasal below, separated above; supraocular small slender; six to nine scales between supraoculars; ten to fifteen small scales surround eye. Head scales small imbricate and keeled; several rows of temporals, lower largest and smooth, others strongly keeled; ten to twelve supralabials, separated from eye by three rows of small scales; mental small; two pairs of chinshields, anterior double size of second, separated by a pair of small scales; twelve or thirteen infralabials, four or five touching the anterior chinshields, maxillary with a large fang.

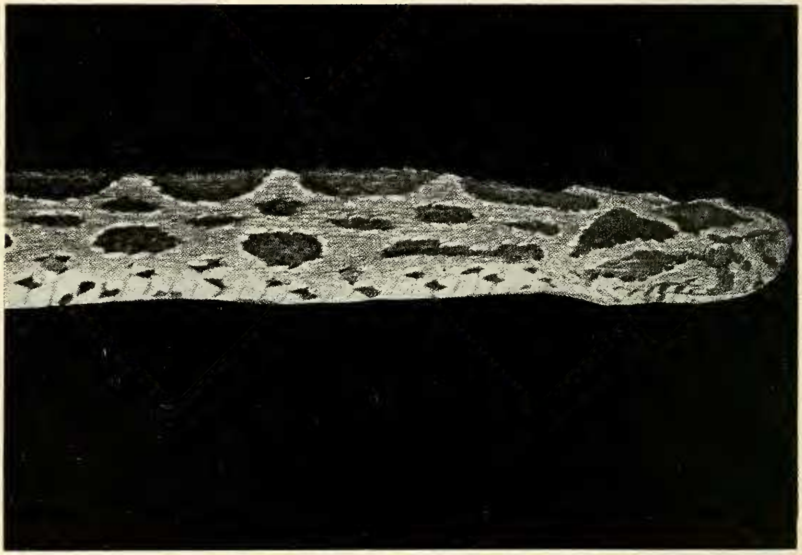

FIG. 119. *Vipera russellii siamensis* M. Smith. From M. Smith, Journ. Nat. Hist. Soc. Japan, vol. 2, No. 3, pl. fig. 1.

Scalerows: 25-29; 27-33; 21-23, all, except a smooth outer row, strongly keeled; ventrals, 153-180; caudals, 41-64, paired.

Color: Light brown to buff brown with three longitudinal rows of oval spots usually brown in the center with a border of black, edged with light buff-white. Occasionally spots touch or fuse; a row of small black spots between dorsal and lateral spots. Yellowish white on venter uniform or with semilunar black spots; small irregular black spots along flanks.

Measurements in mm.: Total length, 1270; tail, 210; specimens reported reaching more than one and one-half meters (measurement of a specimen given by M. Smith, *loc. cit.*, p. 484).

Distribution: In Thailand the species is known only in a small area north of Bangkok extending to Lop Buri and Nakhon Ratchisima. It is unknown elsewhere in the country. Isolated populations appear capriciously in areas in the Indo-Australian Archipelago, which have been recognized by subspecific names.

Family CROTALIDAE Gray

Crotalidae Gray, Ann. Philos., 1825, p. 204.

Diagnosis: Maxillary bone excavated by a deep fossa, which opens externally; fang not grooved in front; a postfrontal bone.

I recognize two subfamilies *Crotalinae* and *Lachesinae.*

Subfamily LACHESINAE Cope

Lachesinae Cope, Rep. U. S. Nat. Mus., 1898 (1900), p. 113.

Diagnosis: Characters of family; no jointed epidermal caudal appendage.

This group is widespread in both hemispheres.

KEY TO THAI GENERA OF THE LACHESINAE

1. Nine normal symmetrical head shields........................*Agkistrodon*
2. Upper part of head covered for the most part with small scales except for presence in some species of supraoculars......................*Trimeresurus*

Genus *Agkistrodon* Palisot de Beauvois

Agkistrodon Palisot de Beauvois, Trans. Amer. Phil. Soc., vol. 4, 1799, p. 381 (type of genus, *A. mokasen*).

Leiolepis Duméril and Bibron, Mem. Acad. Sci. Fr., vol. 23, 1853, p. 534 (type of genus, *Trigonocephalus rhodostoma*) (not of Cuvier).

Calloselasma Cope, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 336 (Substitute name for *Leiolepis* preoccupied).

Diagnosis: Pit vipers with dorsal head scales complete or nearly so; eye with a vertical pupil; maxillary with a very large fang but no other teeth. Hypapophysis developed throughout vertebral column; a lateral sensory pit on snout; body nearly cylindrical; scales smooth or keeled; tail moderate or short; subcaudals paired or some (or all) single; anal entire; third and fourth supralabials largest, in contact with subocular which may or may not be divided.

Only a single species of the genus occurs in Thailand. It is widespread in the country and is one of the dangerous snakes, though not necessarily a deadly one. Its color in grays and browns makes it difficult to see on the ground. Often it is not frightened by the presence of human beings. One specimen crawled into my camp, while I was moving about and paid little or no attention to my presence.

Agkistrodon rhodostoma (Boie)

(Fig. 120)

Trigonocephalus rhodostoma Boie, Isis, 1827, p. 561 (type-locality, Java); Schlegel, Essai sur la physionomie des serpents, vol. 2, 1837, p. 547, pl. 20, figs. 1-3; Jan and Sordelli, Iconographie générale . . . livr. 46, 1874, pl. 6, fig. 2.

Ancistrodon rhodostoma: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, pp. 527-528; Fasciculi Malayenses, Zoology, vol. 1, 1903, p. 170; A vertebrate fauna of the Malay Peninsula; Reptilia and Batrachia, 1912, pp. 213-214, fig. 64; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 164 ("Patani"); Journ. Bombay Nat. Hist. Soc., vol. 23, 1915, p. 788; Gyldenstolpe, Küngl. Sven. Vet-Akad. Stockholm; vol. 55, 1916, p. 27; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 279-281, figs. 114-115; Tweedie, The snakes of Malaya, 1954, pp. 114-115, pl. 10, text fig. 26, a, b.

Agkistrodon rhodostoma: Barbour, Mem. Mus. Comp. Zool. Harvard Coll., vol. 44, 1912, p. 139; Cochran, Proc. U. S. Nat. Mus., vol. 67, 1930, p. 37; Bourret, Les serpents de l'Indochine, 1936, p. 452-454, fig. 179; Taylor and Elbel, Univ. Kansas Sci. Bull., vol. 38, pt. 2, 1958, p. 1168 (Sakon Nakhon).

Ancistrodon annamensis Angel, Bull. Mus. Nat. Paris, ser. 2, vol. 4, 1933, p. 277-278, fig. (type-locality, "Vinh Hoa, South Annam").

Agkistrodon annamensis: Bourret, Les serpent de l'Indochine, vol. 2, 1936, p. 454.

Calloselasma rhodostoma: Günther, The reptiles of British India, 1864, pp. 391-392; Tirant, Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge, 1885, pp. 37, 63.

Diagnosis: Stout-bodied snake rarely reaching more than 700 mm. in length; head large triangular; snout pointed; two anterior temporals, lower the larger; formula of scalerows: 21, 21 (19), 17 (15). Head with nine typical head scales above; a sensory pit between eye and nostril; an elongate subocular, touching two labials.

Description of species (from No. 35679; near Rompibon, [Tonka Harbor Tin Mine], Nakhon Si Thammarat): Head strongly triangular; the snout turned up slightly at tip; rostral as wide as high, not or scarcely visible from above; internasals little more than one third of area of prefrontals; frontal rather small, its length a little less than its distance from end of snout, shorter than parietals, slightly wider than supraoculars; nasal partially or wholly divided, anterior portion the higher and equal or greater in area than posterior; latter pointed at its posterior end; a canthal (loreal) precedes preocular; a rather large scale forms anterior border of sensory pit; lower preocular divided vertically, forms lower border of sensory pit, middle preocular, the upper border; subocular elongate, curving diagonally, separated from supraocular by a single postocular; two large and two small superimposed anterior dorsal temporals; three secondary temporals; seven (eight) supralabials, third

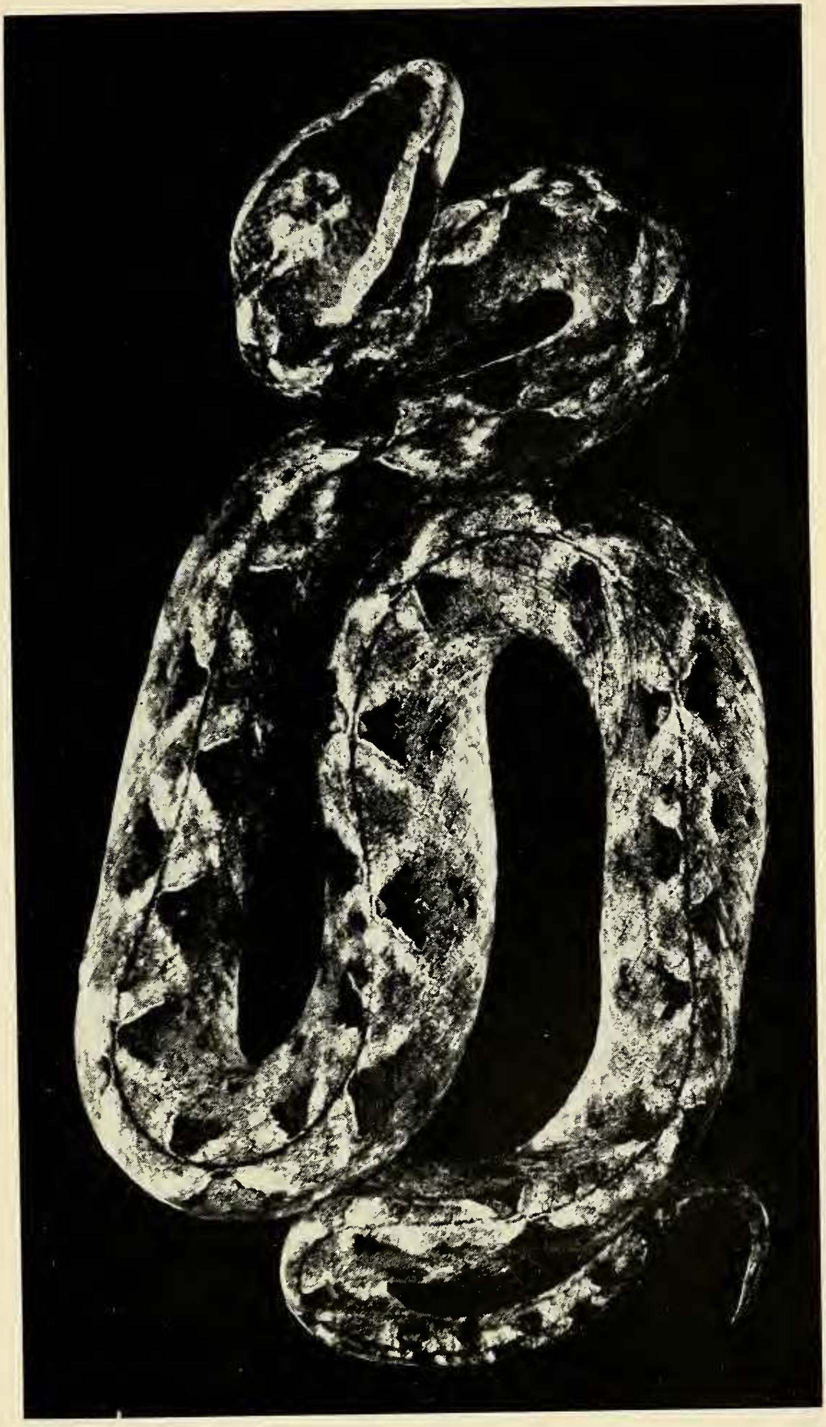

FIG. 120. *Agkistrodon rhodostoma* (Boie). No. 35624, Ronpibun, Tin Mine, Nakhon Si Thammarat province. Actual total length, 681 mm.; tail, 84 mm.

and fourth bordering subocular; eleven infralabials, first three bordering first pair of chinshields which are considerably larger than second or third pairs.

Scale-formula: 35 (occiput), 23, 22, 17; scales with two apical pits. Ventrals, 155; divided subcaudals, 39, (the terminal one single, elongate, [6 mm.], hornlike); anal, single.

Color: Head gray-brown with a light, dark-bordered stripe on each side; an elongate temporal spot, its lower edge bordered with a black and a white line forming a festooned pattern; below this line and forward the labials are grayish; body variable brownish gray with a series of paired dark-brown spots edged on two sides with a narrow blackish line bordered by a bluish-white line, the spots touching or narrowly separated on middorsal line. A very narrow black middorsal stripe. Venter brownish white clouded or peppered thinly with pigment.

Measurements in mm.: See table.

Table of measurements of Thai *Agkistrodon rhodostoma*

NUMBER	35679	210	209
Sex	♀	♂	♂
Snout to vent	638	608	589
Tail	74	68	78
Width of head	29	28	29
Length of head	42	35	37

Variation: The known variation in ventrals is: male, 148 to 154; female, 156 to 166; subcaudals, male 45 to 52; females, 35 to 46 (*fide*, M. Smith). Of the two measured specimens (Nos. 209-10) the female has fewer ventrals (154; male, 157), and a larger number of subcaudals (42; male, 37?) which is probably not the usual condition in specimens from the same locality (Na Bon, Nakhon Si Thammarat).

Distribution: In Thailand specimens are known from Lop Buri, Sakon Nakhon, Korat, Chiang Mai, Nakhon Si Thammarat, Trang and Puket. It would appear to be distributed throughout the country save in the higher areas.

Outside of Thailand the species is known in Indo-China, Malaya, and Java.

Remarks: The native name for this serpent is *ngu maaw-sao* and *ngu kaba.* Its dangerous character is well known.

The Pasteur Institute in Bangkok prepares an antivenine specific for this snake. The actual number of deaths from bites of this species is not great. Malcolm Smith who had a long experience with snakes in Thailand regards the bite as rarely fatal. He says (1947, p. 480): "Deaths have been recorded, but they are extremely rare and they appear to have been caused by septic conditions secondary to the bite. In the vast majority of the cases the symptoms are not severe and are quickly recovered from."

Genus *Trimeresurus* Lacépède

Trimeresurus Lacépède, Ann. Mus. Paris, vol. 4, 1804, p. 209 (type of genus, *viridis*).

A number of other generic names have been proposed, based on species not occurring in Thailand.

Diagnosis: Head very distinct from neck, its upper surface largely covered with small scales; a deep pit on side of the snout; vertical pupil in a moderately small eye; large poison-fangs present on a movable maxillary. Tail prehensile or not. Dangerous (although not necessarily deadly) to man.

There are nine species known to occur in Thailand, all but one (*monticola*) being arboreal (or at least semiarboreal). *Monticola* is a terrestrial species and is oviparous. Most if not all of the other Thai species are ovoviviparous.

Key to Thai Species of *Trimeresurus*

1. Twelve to fourteen strongly keeled scales between small supraoculars; nine to ten supralabials, first free from nasal scale, second not bordering loreal pit . . . . *wagleri*

   Nine to fifteen obtusely keeled or smooth scales between supraoculars; second labial borders loreal pit; first fusing with nasal or separated from nasal 2

2. First supralabial completely separated from nasal, tail prehensile or not . . . 3

   First supralabial partly or completely joined to nasal, tail prehensile or not 7

3. Head-scales flat, partly imbricate, larger; five to eight scales (rarely nine) between large supraoculars 4

   Head-scales smaller, subimbricate, nine to thirteen scales between narrow supraoculars 5

4. Head short; tail not prehensile; seven to ten supralabials; two to four rows of scales between supralabials and subocular. Brown with large spots of darker brown; scalerows at mid-body 23 to 25 (very rarely 27); 132 to 158 ventrals . . . . *monticola*

   Head elongate, tail somewhat prehensile; one or two rows of scales between labials and subocular (or third labial may touch subocular); scalerows at mid-body, 21; larger snake . . . . *sumatranus*

5. General color green with a lateral light stripe on outer scalerow bordered above by an orange or chocolate-brown stripe 6

   General color brownish-gray with a dorsal series of irregular brown spots, smaller spots on sides; whitish below; scalerows 19, 19, 15 . . . . . *kanburiensis*

6. Hemipenes strongly spinose . . . . *stejnegeri*
   Hemipenes without spines . . . . *popeorum*
7. General color, green in life 8
   Purplish-brown uniform, olivaceous or grayish above, variegated or spotted and marked with brown; 12-15 scales between narrow supraoculars; 11 to 13 supralabials; two to three rows of scales between supralabials and subocular . . . . *purpureomaculatus purpureomaculatus*
8. Shorter thicker snakes, the temporals strongly keeled; scale-formula: 23 (or 25), 23 (or 25), 17 (or 19); 11 to 14 scales between narrow supraoculars; white line on outer scalerow in males but absent in females; terminal part of tail reddish in life (or brown mottled in preservative) . . . . . . *erythrurus*
   Somewhat slender snakes; temporals feebly keeled. scale-formula: 21 (23), 21 (19), 15 (17); eight to twelve scales between undivided supraoculars; a light lateral whitish stripe, weak or absent in females; a light temporal stripe; tail not red or spotted . . . . *albolabris*

Trimeresurus monticola Günther

(Fig. 121)

Parias maculata (not of Gray, 1842) Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 12, 1853, p. 392 (Sikkim).

Trimeresurus monticola Günther, The reptiles of British India, 1864, p. 388, pl. 24, fig. B (type-locality, Nepal); Stoliczka, Journ. Asiat. Soc. Bengal, vol. 40, 1871, p. 445; Fayrer, Thanatophidia of India . . . 1874, pl. 15; Anderson, Anatomical and zoological researches and zoological results of the Yunnan Expedition, 1879, p. 832, pl. 76; Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 426; Miller, Journ. Bombay Nat. Hist. Soc., vol. 15, 1904, p. 729; Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, pp. 251, 821; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, no. 1, 1923, p. 64 ("Doi Chiang Dao, Hills west of Chumphon"); Bull. Raffles Mus., no. 3, Apr. 1930, p. 90; Pope, The reptiles of China . . . 1935, p. 412, M. Smith, Proc. Zool. Soc., London, 1921, p. 427; Rec. Ind. Mus., vol. 37, 1935, p. 240; *ibid.*, vol. 42, 1940, p. 485; Bourret, Les serpents de l'Indochine, 1934, p. 457; Smedley, Bull. Raffles Mus., no. 6, 1931, p. 123; M. Smith, The fauna of British India . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 508-510, fig. 161.

Lachesis monticola: Boulenger, Catalogue of the snakes in the British Museum (Natural History), vol. 3, 1896, pp. 548-549; Annandale, Rec. Ind. Mus., vol. 8, 1912, pp. 50, 64; Venning and Wall, Journ. Bombay Nat. Hist. Soc., vol. 20, 1910, p. 343, 775; Wall, *ibid.*, vol. 18, 1908, p. 334; *ibid.*, vol. 19, 1909, p. 356; *ibid.*, vol. 21, 1911, p. 284; Rec. Ind. Mus., 1907, p. 157.

Trimeresurus convictus Stoliczka, Journ. Asiat. Soc. Bengal, vol. 39, 1870, p. 224, pl. 12 (type-locality, West Hill, Penang).

Trimeresurus orientalis Schmidt, Amer. Mus. Nov., no. 175, 1925, p. 3 (type-locality, Shao-wu, Fukien).

Trimeresurus tonkinensis Bourret, Bull. Gén. Inst. Publ. Hanoi, 1934, p. 10; Les serpents de l'Indochine, 1936, p. 460 (type-locality, Chapa, Tongking).

Trimeresurus monticola meridionalis, Bourret, Bull. Gen. Inst. Publ. Hanoi, no. 9, 1935, p. 13; Les serpents de l'Indochine, 1936, p. 459, fig. (type-locality, Chapa, Tong-King).

Diagnosis: An egg laying, ground living, pit viper reaching a little more than one meter in length (1100 ♀); head scales smooth; first labial completely separated from nasal; subocular broken up into small scales; a pair of internasals; brown with darker brown spots; venter lighter, yellowish dusted with brown.

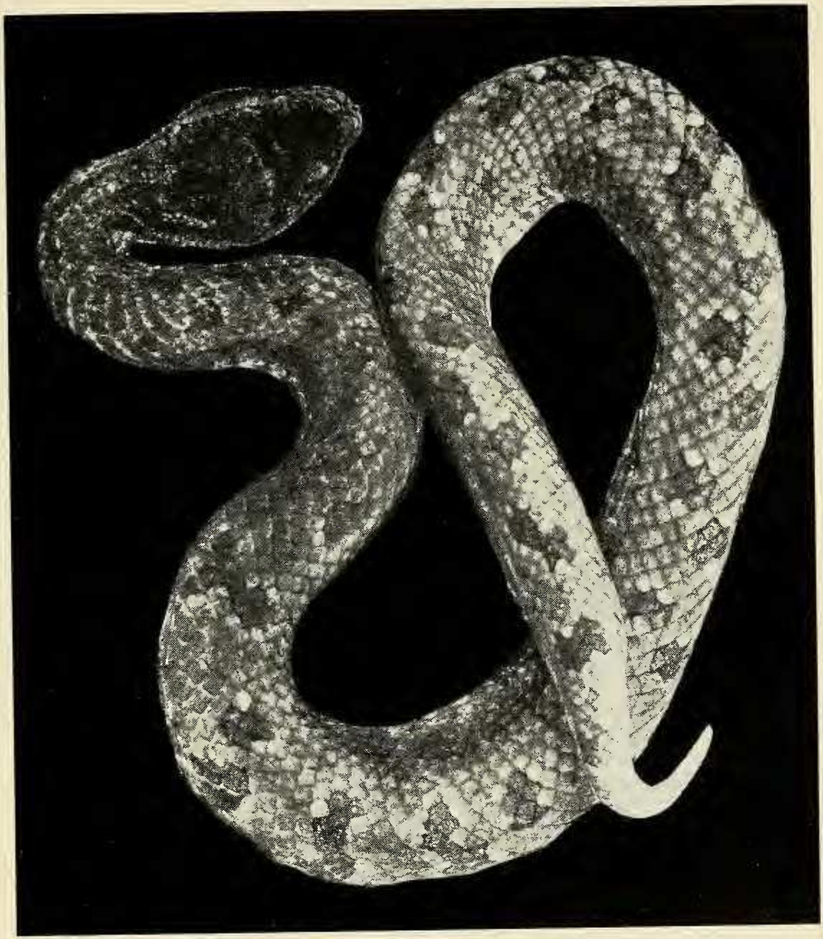

Fig. 121. *Trimeresurus monticola* Günther. EHT-HMS No. M.8, Fraser's Hill, Malaya. Actual total length, 666 mm.; tail, 58 mm.

Description of species (from EHT-HMS No. M.8, Fraser's Hill, Malaya): Rostral slightly wider than high, not or scarcely visible from above snout, bordered laterally by labial and nasal, posteriorly by three very small scales; a pair of internasals forming a short median suture; nasal large, partly divided by a suture entering on upper edge and reaching nostril; a large upper loreal below which is a second small loreal; this with second labial forms anterior border of nasal pit (second labial with a groove but no suture across upper border); three preoculars, two lower ones partly separated by pit; supraoculars large, separated by five rows of irregular scales, median row largest; subocular short, partly broken into smaller scales; three small postoculars; eye small; pupil vertical; supralabials, 9-8, third largest, separated from subocular by two scalerows, from fourth labial by three rows; three or four rows of somewhat enlarged smooth temporals. Mental with a wider labial border than rostral; infralabials, 11-11, three touching first pair of chinshields; second pair of chinshields absent or no larger than other scales on chin.

Dorsal scales smooth, formula for scalerows: occiput, 40; neck, 23; middle, 23; before vent, 17. Ventrals, 138; anal, single; subcaudals, 23, the last two single.

Color: Above and on sides brown, darker anteriorly; top and sides of head blackish brown; a brown stripe behind eye; tail, light brown becoming greenish yellow on latter half; 22 dark brown spots along each side of median line, each covering four to six scales, sometimes paired, sometimes alternating, rarely fused; at border of each spot, several bordering scales may be cream or yellowish, covering one, rarely two, scales; a second row of spots indicated lower on side; venter dull yellowish, each ventral scale dusted with brown; yellowish color encroaching at times on outer scalerow; subcaudal area, light variegated brown, tip of tail greenish yellow. A yellow line crosses angle of mouth and continues a short way on neck; two yellow spots on infralabials extending on to the chin. Throat and chin light, dusted with brown.

Measurements in mm.: Snout to vent, 608; tail, 58; total length 666; width of head, 30; length of head, 41.

Variation:[*] The extraordinary range of ventrals and subcaudals strongly indicate subspecific variation; several forms have been named (see synonymy).

The variation in ventral count is from 127 to 176; of subcaudals, 21 to 62; the scalerows around the body vary between 21 and 25 and may be feebly keeled instead of completely smooth; a second series of dark brown spots may be distinct, and another series at outer ends of the ventral scales (barely indicated in the described specimen); the markings on the young are more contrasting and distinct.

The second labial may be divided at the groove and this portion fused to the lower loreal; the scalerows between supraoculars may vary between 5 and 9.

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[*] Malcolm Smith gives the following data: In specimens from eastern Himalayas, Assam, Burma, SE Thibet, Yunnan, and Siam, the range in 30 specimens is, ventrals, 137-176; subcaudals, 36-62; for Annam, Tongking, South China, 127-144: 36-54, Malay Peninsula, 133-137; 22-28.

Distribution: In Thailand known in Chumphon province.

Elsewhere the species ranges from Nepal, Assam, and Burma through the eastern Himalayas east to Yunnan southern Thibet, Indo-China, and Malaya. The specimen described is from Fraser's Hill, Malaya. A specimen is known from Mt. Muleyit, Tenasserim, Burma. It is a high mountain form and may be looked for at proper elevation anywhere within the range given.

Remarks: The species unlike most members of the genus *Trimeresurus* lays eggs instead of giving birth to its young. In certain genera of reptiles it is the high mountain forms that give birth to their young, while the lowland members lay eggs.

Trimeresurus purpureomaculatus (Gray and Hardwicke)

Trigonocephalus purpureomaculatus Gray and Hardwicke, Illustrations of Indian Zoology, vol. 1, 1832, pl. 81 (based on a drawing by Hardwicke (type-locality, Singapore).

Two subspecies of this form are recognized: the typical form which is known in Thailand, and *andersoni* known only in the Andaman and Nicobar Islands.

Trimeresurus purpureomaculatus purpureomaculatus (Gray and Hardwicke)

Trimeresurus purpureomaculatus: Boulenger, The fauna of British India . . . Reptilia and Batrachia, 1890, p. 429; Proc. Zool. Soc. London, 1890, p. 36; Pope and Pope, Amer. Mus. Novitates, no. 620, p. 1933, p. 11.

Lachesis purpureomaculatus: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, p. 553 (*part.*).

Trimeresurus purpureomaculatus purpureomaculatus: M. Smith; The fauna of British India . . . vol. 3, Serpentes; 1943, pp. 520-521.

Trimeresurus acutimentalis Werner, Sitz. Akad. Wiss. Wien, vol. 135, p. 257 (type-locality, South India).

Diagnosis: Upper head scales small, granular, or tuberculate; supraoculars very narrow, sometimes broken up; first labial partly or completely joined to nasal; 25 to 27 scalerows around body; temporal scales keeled; head olive; head and tail brown spotted; a ventrolateral light line present or absent.

Description of species: Snout twice as long as diameter of eye; upper head scales small tuberculate; twelve to fifteen scales between supraoculars, which are narrow or broken up into small scales; internasals large, two or three times size of adjoining scales.

Rostral as deep as broad barely visible above; head-scales small, juxtaposed, tubercular or granular, convex or slightly keeled; internasals small, but two to three times larger than adjoining scales and separated from each other by one or two scales; two or three postoculars and an elongate subocular; latter separated from supralabials by two or three rows of scales; eleven to thirteen supralabials; first usually fused wholly or partly with nasal, second forming anterior border of the pit; beyond fourth the scales are small; temporal scales keeled.

Scalerows: 25, 25(27), 19(21), strongly keeled. Ventrals, 160 to 179 in males; 168 to 183 in females; subcaudals, 74 to 76 in males; 56 to 63 in females; anal undivided. Tail prehensile. Snout twice as long as eye.

Color: Dark purplish brown, uniform or variegated with pale green; flanks usually pale green or spotted with that color, sometimes with a line or a series of pale, spots on outer scalerow. Olive or greenish white below, uniform or spotted with black.

Measurements in mm.: Male, total length, 665; tail, 125; female, total length, 900; tail, 140 mm.

Distribution: Southern Thailand, south of the Isthmus of Kra. Known also from Malaya and southern Burma.

Trimeresurus wagleri wagleri (Boie)

(Figs. 122, 123)

Cophias wagleri Boie, Isis, 1827, p. 561 (type-locality, Java).

Trigonocephalus sumatranus: Cantor, (not of Raffles) Journ. Asiat. Soc. Bengal, vol. 16, 1847, p. 1042, pl. 40, fig. 9.

Lachesis wagleri: Boulenger, Catalogue of the snakes in the British Museum, 2nd Ed., vol. 3, 1896, p. 562; S. Flower, Proc. Zool. Soc. London, 1899, p. 696; Ridley, Journ. Straits Branch Royal Asiat. Soc., no. 32, 1899, p. 202.

Trimeresurus wagleri: Günther, The reptiles of British India, 1864, p. 388; Boulenger, A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 218-219; M. Smith, Journ. Nat. Hist. Soc. Siam, vol. 2, 1916, p. 164 (Pattani); de Rooij, The reptiles of the Indo-Australian Archipelago, vol. 2, Ophidia, 1917, pp. 286-288, fig. 117; Tweedie, The snakes of Malaya, 1954, pp. 116-117, pls. 11, 12 (excellent photographs); Sworder, Singapore Nat., no. 2, 1922, p. 73; M. Smith, Bull. Raffles Mus., no. 3, 1930, p. 90, "states that he has examined a specimen from 'Pangnga' on the mainland of peninsular Siam, just north of Puket."

Diagnosis: About 14 scales between supraoculars; all head scales strongly keeled; a pair of enlarged internasals; first supralabial separated completely from nasal; second labial not forming anterior border of sensory pit; third labial not in contact with subocular; third and fourth supralabials separated from suboculars by one row of scales; tail prehensile; green, with small paired yellow or reddish spots.

Description of species (from No. 34421, Na Pradoo, Yala): Head strongly triangular diameter of neck less than a third of width of

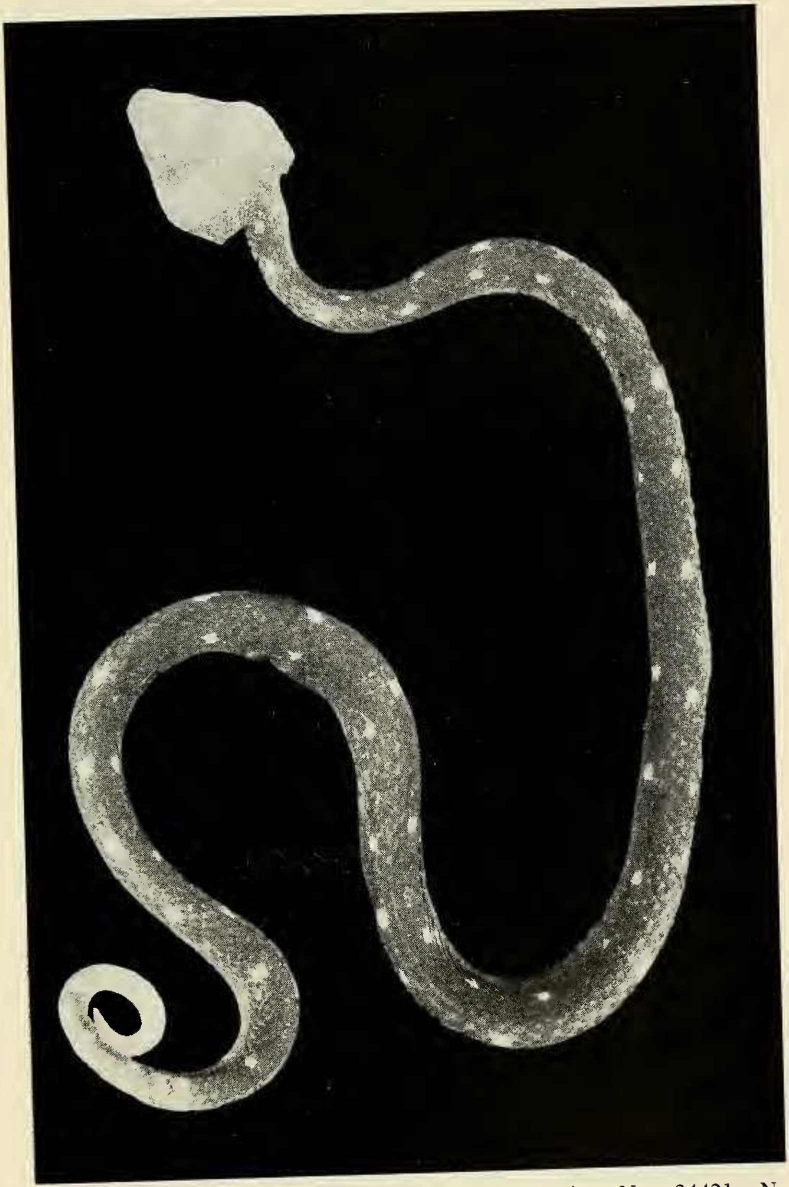

FIG. 122. *Trimeresurus wagleri wagleri* (Boie). No. 34421, Na Pradoo, Pattani, southern Thailand. Actual total length, 326 mm.; tail, 49 mm. (young).

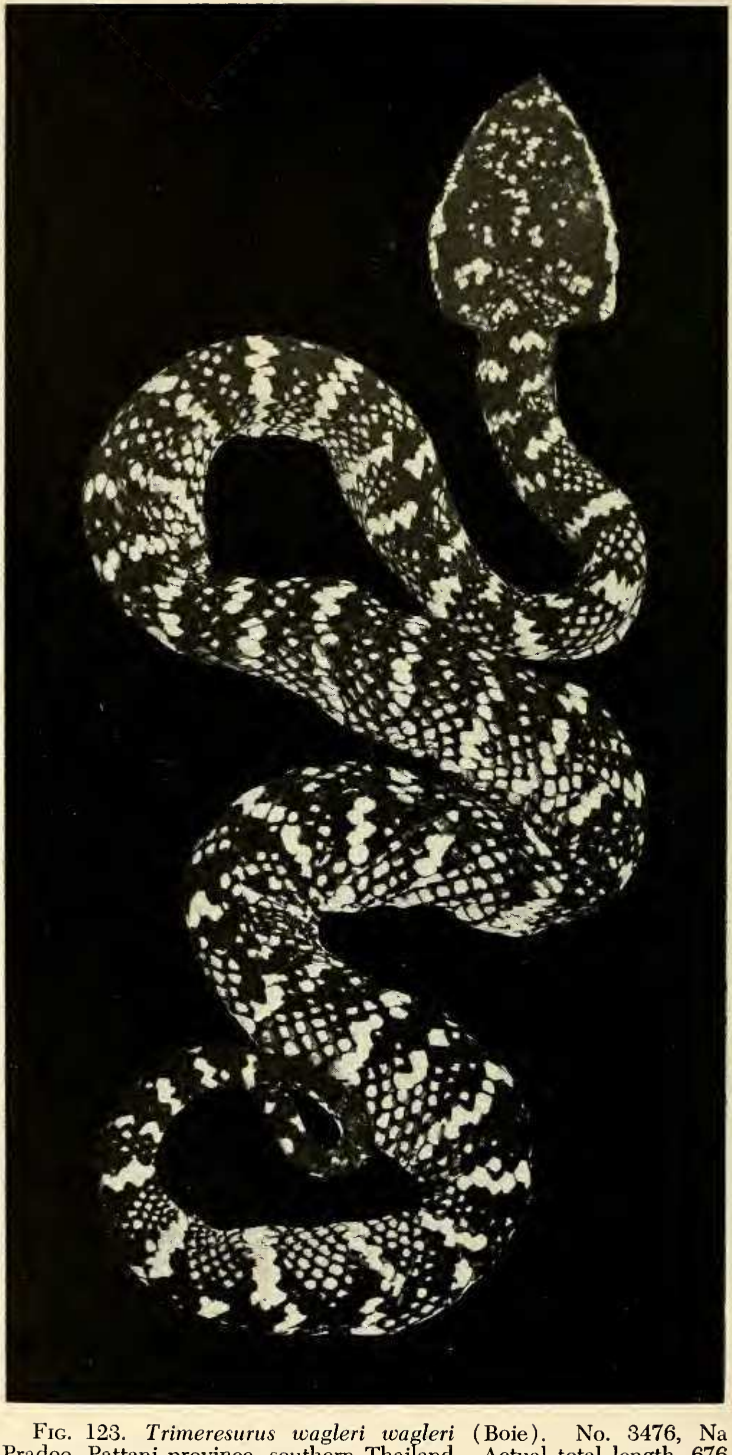

FIG. 123. *Trimeresurus wagleri wagleri* (Boie). No. 3476, Na Pradoo, Pattani province, southern Thailand. Actual total length, 676 mm.; tail, 103 mm. (adult).

head; rostral a little wider than high, standing vertically, visible above as a narrow line; internasals enlarged, three to four times size of adjoining head scales; about fourteen scales between supraoculars; all scales on head strongly keeled, and strongly imbricate; supraoculars two and a half times as long as wide; nostril in a single lateral nasal; two upper preoculars preceded by a canthal scale which in turn is separated by a scale from internasal; lower preocular not clearly differentiated, borders sensory pit below, while a large scale borders anterior part of pit; a large subocular; three postoculars; two small loreals between nasals and scale preceding pit; supralabials nine, third largest, none bordering elongate curved subocular; infralabials 11-12, posterior scales with tubercular keels; three border the anterior enlarged pair of chinshields which are followed by three equal-sized smaller pairs.

Scales about occiput, 47; about neck, 23; middle of body, 21; before vent, 17, all keeled except outer row. Ventrals, 147; single anal; subcaudals, 58 (divided). Diameter of eye half of distance from eye to middle point of snout.

Color: Green above with about 25 small paired yellow or yellowish-white spots usually edged with reddish, the pairs usually opposite each other, occasionally alternating. Tail reddish or yellowish with six or seven yellowish paired spots that may join on mid-line on posterior part of tail; a yellow or yellowish-white line on each side of head bordered by red or red-brown passing through eye; venter pale green with or without darker edges to ventrals; eye yellow.

Measurements in mm.: Total length, 326; tail, 49; head-width, 16; head-length, 18.

Variation: The coloration of the adult differs very much from that of the young. Tweedie (1954) describes one as follows: Adult black with scattered green spots above passing to green with the scales black-bordered on the sides; this pattern crossed by numerous cross-bars, green above, yellow on the sides; ventrals greenish white with irregular yellow patches, black borders and occasionally, black spots. Head black above with irregular green markings; lips and lower surface of head yellow and greenish-white, the scales with black sutures. Tail black, speckled with green above and below.

The ventrals vary between 127 and 154; the subcaudals, between 45 and 56. The anal is divided. The scalerows vary between 21 and 25; the supralabials between eight and ten. The number of scalerows between the supraoculars varies between eight and 14. The maximum length of the species is approximately one meter.

Remarks: Specimens are often seen in coastal areas, especially in the mangroves, swamps and with *Boiga dendrophila* it shares the name "Mangrove snake" or a native equivalent. In southern Thailand it is known under the Malay name of *ular bakaw.*

Distribution: The snake is known only in the southern Changwats of Thailand, specimens having been taken in Pattani, Yala and the island Phangnga. Outside of Thailand the snake is widely known in Malaya and the larger and most of the smaller East Indian islands extending into the Philippines and Celebes. These animals are rather sluggish. They may be captured by disturbing the tail with a cane or stick about which they will wrap their prehensile tail; then they may be lifted and carried considerable distances (a quarter mile or more) suspended from the stick.

Trimeresurus sumatranus (Raffles)

Coluber sumatranus Raffles, Trans. Linn. Soc., vol. 13, 1822, p. 334 (type-locality, Sumatra).

Trigonocephalus formosus Schlegel *in* Temminck, Verh. Nat. Ges. Ned. Ind. Rept., 1844, p. 52, pl. 7 (type-locality, Sumatra).

Bothrops formosus: Jan and Sordelli, Iconographie générale des ophidiens, livr. 47, 1875, pl. 5, fig. 1.

Lachesis sumatranus: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 557-558; A vertebrate fauna of the Malay Peninsula . . . Reptilia and Batrachia, 1912, pp. 217-218; de Rooij, The reptiles of the Indo-Australian Archipelago, vol. II, Ophidia, 1917, pp. 283-284.

Bothrops sumatranus: Lidth de Jeude, Notes Leiden Mus., vol. 8, 1886, p. 52, pl. 2, fig. 6.

Trimeresurus sumatranus: M. Smith, Journ. Federated Malay States Mus., vol. 10, 1922, p. 268 (Kuala Teku, Malaya); Bull. Raffles Mus., no. 3, 1930, p. 90 (Pattani, Thailand); Tweedie, The snakes of Malaya, 1954, p. 117.

Diagnosis: Large species reaching more than a meter in length; scales between supraoculars smooth; gular scales smooth; snout not raised above nostrils; supraoculars large separated by from four to nine scales; scalerows at mid-body, 21; tail, prehensile.

Description of species (from literature): Head rather elongate; rostral as high as broad or a little broader than high; nasal partly or wholly divided; scales on top of head large, flat, smooth, imbricate, largest on snout, four to nine between large supraoculars; two or three postoculars; a subocular which touches third and often also fourth supralabials; temporal scales smooth; nine to eleven supralabials, first not fused to nasal; second forming anterior border of loreal pit; third largest.

Scales on dorsum in 21 rows, feebly keeled; ventrals, 180-190; subcaudals, 58 to 82; anal, single. Tail prehensile.

Color: Bright geen above, scales usually black-edged with or without cross-bands; two dorsal series of small whitish spots may be present on dorsum; a yellowish or whitish streak on outer scale-row; ventrals yellowish or greenish; scales with or without fine dark edges. End of tail red.

Measurements in mm.: Total length, 1100; tail, 180.

Distribution: The species is included in the Thai list on the basis of a report by Dr. Malcolm Smith, (1930)—"I have recently examined a specimen from Patani."

The species is widely distributed in Palawan, Borneo, Sumatra, Nias, Singapore and Malaya.

Trimeresurus albolabris Gray

(Fig. 124)

Trimeresurus albolabris Gray, Zoological miscellany, 1842, p. 48 (type-locality, China); Catalogue of the snakes in the collection of the British Museum, 1849, p. 8; Pope and Pope, Amer. Mus. Novitates, no. 620, 1933, p. 9; Pope, The reptiles of China, 1935, pp. 405-408, fig. 76, head; M. Smith, Rec. Ind. Mus., vol. 42, 1940, p. 485; The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1942, pp. 523-524.

Diagnosis: Similar to *T. erythrurus* but having a green tail neither reddish nor brown spotted, in having a higher average of combined ventrals and subcaudals (in females 231, male 238) as compared with 208 for Bangkok *erythrurus;* one loreal usually present, normally absent in *erythrurus.*

Description of species (from No. 3, Royal Forest Department): Rostral a little wider than high, visible above only as a narrow line; internasals larger than other scales, separated from one another mesially by a single scale; first supralabial fused with nasal; no loreal; second infralabial borders front of sensory pit; three preoculars, sensory pit partially separating the two lower scales; third supralabial touching subocular, fourth separated from it by one row of scales, fifth and sixth by two or three rows; supraoculars large, undivided, separated from each other by eleven or twelve scales; scale, preceding two upper preoculars, enlarged; scales on snout and top of head smooth, imbricating; temporal scales bluntly keeled; nine-ten supralabials; mental with a broader labial border than rostral, pointed behind, almost separating first labials from one another; first pair of chinshields largest, touching three supralabials; three other paired chinshields follow; twelve infralabials.

Scale-formula: 46 (occiput), 25, 21, 19, 15, all keeled except outer row and part of second row. ♀ Ventrals, 170; anal, single; subcaudals, 52. Tail prehensile.

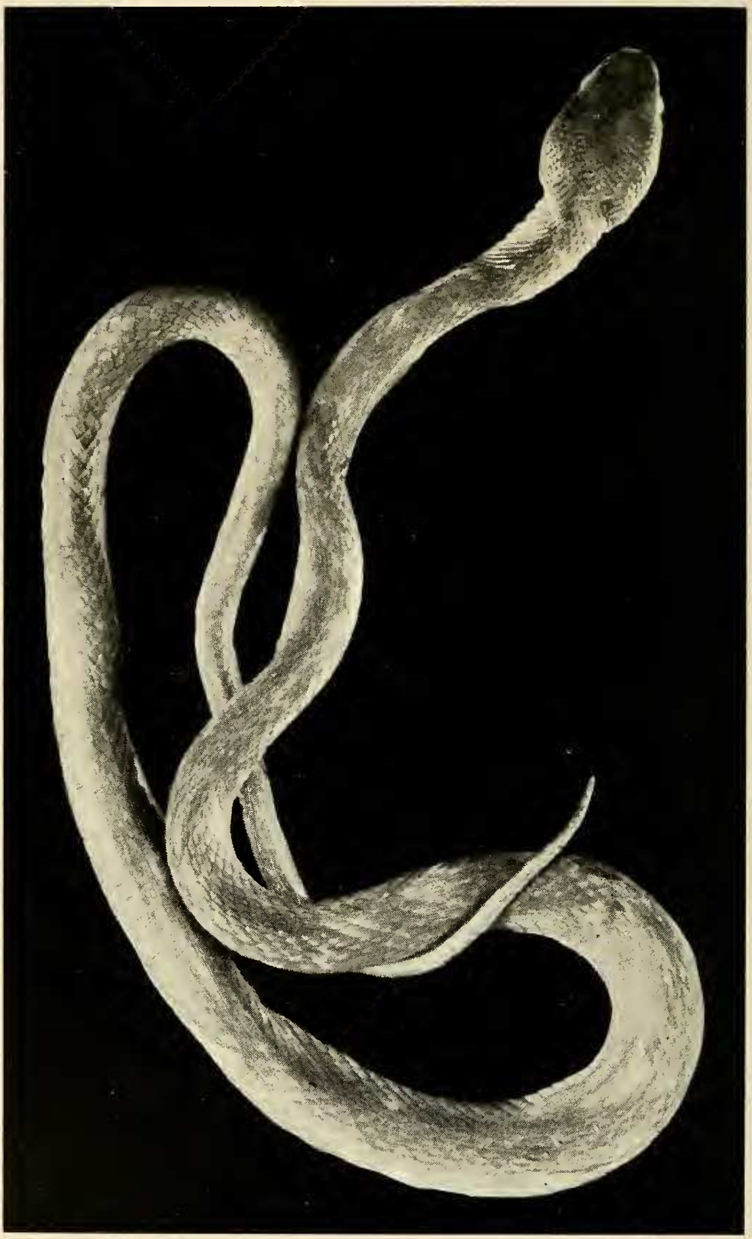

FIG. 124. *Trimeresurus albolabris* Gray. A specimen from Thailand. About natural size. Locality uncertain.

Color: Head brownish with some lighter areas on scales about sensory pit, and on supralabials; body dark grayish with very numerous irregular transverse dark spots or bands, each more or less reaching venter except that it is broken by a whitish dotted line on outer scalerow; spots variable, sometimes confined to one ventral, sometimes to two or more; posteriorly outer part of ventrals all brown, middle third grayish (probably greenish white in life). One presumes the grayish areas also were green in life; lateral light stripe greenish white. Chin and throat dirty white; tail somewhat brown mottled.

Measurements in mm.: Snout to vent, 516; tail, 81; total length, 597; width of head, 22; length of head, 25.5; eye-length, 3.85; snout-length, 8.

Remarks: This specimen has the squamation of *Trimeresurus albolabris* while the coloration approaches that of *purpureomaculatus.* It is possible that with a series one might be able to separate this from *albolabris.*

Measurements in mm. and scale data on *Trimeresurus albolabris*
(from Doi Suthep, Chiang Mai)

NUMBER	36548	36540	36547	36546
Sex	♀	♂	♀	♂yg.
Length	874	662	595	290
Tail	141	133	89	52
Scalerows, neck	27	23	29	26
Scalerows, body	21	21	21	21
Scalerows, before vent	15	15	15	15
Ventrals	172	167	169	164
Subcaudals	58	71	54	70
Loreal	0	1	1	1
Labial fused to nasal	yes	yes	yes	yes

Trimeresurus popeorum M. Smith

(Fig. 125)

Trimeresurus elegans: Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 12, 1853, p. 391 (*nec* Gray, 1849).

Trimeresurus gramineus: Pope and Pope, Amer. Mus. Nov., no. 620, 1933 p. 3.

Trimeresurus popeorum M. Smith, Journ. Bombay Nat. Hist. Soc., vol. 39, p. 730; The fauna of British India, including Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1945, pp. 518-519 (the original spelling *popeiorum* is a clerical error).

Diagnosis: First labial completely separated by a suture from nasal; two loreals; second labial forms anterior boundary of facial

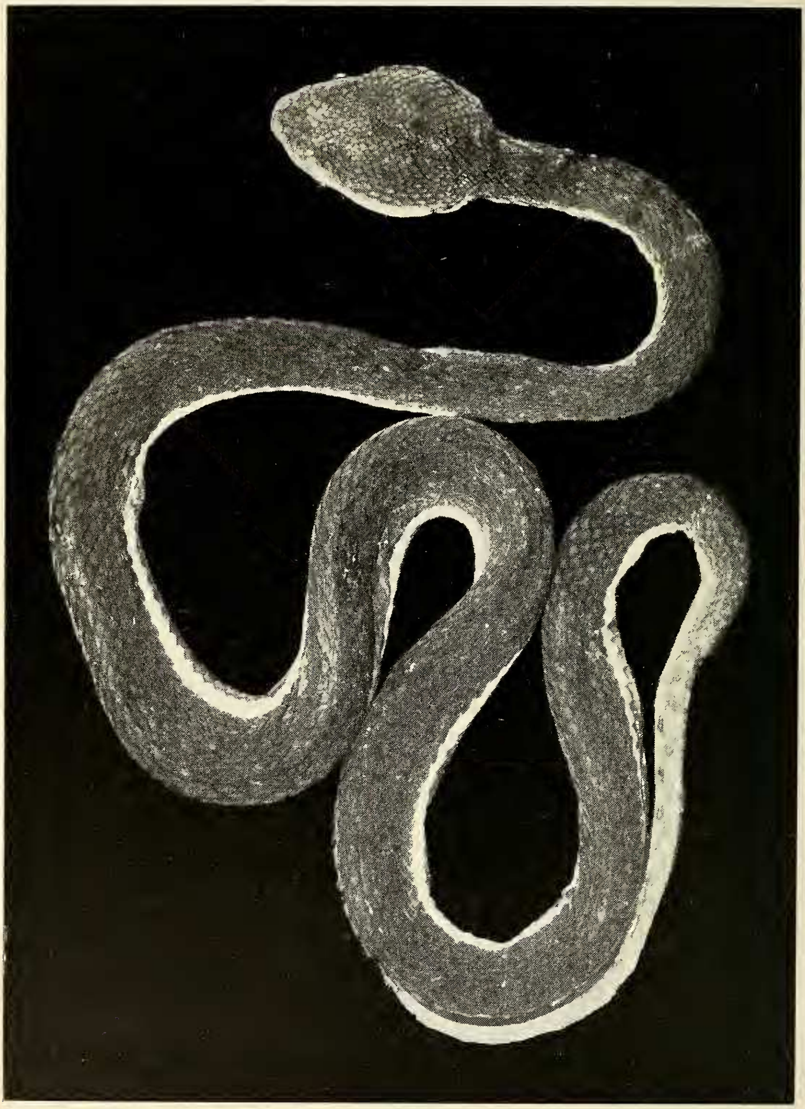

FIG. 125. *Trimeresurus popeorum* M. Smith. EHT-HMS No. 31800, Phu Nam Lang (Mt.) 1780 m. elev., Ban Khok, Na Phung, Dan Sai, Loei, province, central Thailand. Actual total length, 412 mm.; tail, 69 mm. (From Taylor and Elbel.)

pit; labials separated from subocular by none or by only one scale; body with dimly keeled scales for part of its length. A lateral salmon stripe and two series of cream or white marks.

Description of species: Rostral triangular, wider than high, can be seen from above only as a short narrow line, in contact with a small median scale; nostril pierced in a large nasal the two scales very narrowly separated by upper tip of rostral; nine supralabials, first completely separated from nasal, second high forming anterior border of facial pit; third largest touching elongate subocular, fourth, fifth and sixth supralabials separated from subocular by single scales; three elongate preoculars, two lower forming upper lower and posterior borders of facial pit; two small loreals; three small canthal scales border upper edge of nasal; supraocular elongate, irregular on left side, separated from posterior (fourth) canthal, but on right side divided, the anterior portion fused to last canthal; about 15 scales in a row between supraoculars; three or four rows of temporals somewhat enlarged, a few having faint keels; 28 scales between posterior supralabials; mental an equilateral triangle; infralabials, 11-12, the first pair in contact, three bordering first chinshields; two chinshields following separated by one or two scales.

Scale-formula: 32 (between ends of fifth ventral), 21, 21, 15; ventrals, 164; subcaudals, 72; some dorsal scales more or less keeled.

Color in life: Above a deep green; under a lens each dorsal scale shows some deeper green that appear blackish in fixative; head a shade of olive-green; a salmon or rusty red line begins on lower preocular, passes back along side of head behind angle of mouth, then down to first (outer) scalerow where each scale has this color except at tip where there is a regular cream spot; lower part of each scale of second row greenish white, later becoming cream. On base of tail a single cream zig-zag line bordering salmon which now appears only on outer edge of subcaudals. Tail above green with numerous dim dull-brownish spots or flecks; tip of tail lighter; venter green, edges of most scales showing a minute edging of white.

Measurements in mm.: Total length, 710; snout to vent, 577; tail, 133; width of head, 22; length of head, 30; diameter of neck, 9.

Variation: A small female specimen, also taken on Doi Suthep, has 12 scales between the undivided supraoculars. The internasals are separated by a single scale, and there are two loreals. The supralabials are separated from the subocular by a single scalerow.

The third supralabial may or may not touch the scale. There are 10-10 supralabials, 12-12 infralabials. The scale-formula: 21, 21, 15; 166 ventrals and 67 subcaudals. The color is practically identical with the specimen described.

Smith gives the following variation in 6 males: Ventrals, 161 to 172; subcaudals, 71 to 79; females, 157 to 169; 58 to 74. Scale-formula: 21 (23), 21, 15 (17).

Distribution: In Thailand the species has been taken in northern Thailand, Chiang Mai and Chiang Rai. Elsewhere the species is known in the eastern Himalayas, Assam, Burma, Malaya, Borneo and Sumatra.

Trimeresurus stejnegeri K. Schmidt

Trimeresurus gramineus: Boettger, Ber. Senck. Ges., 1894, p. 135 (Hainan); Stejneger, Bull. U. S. Nat. Mus., no. 58, 1907; Proc. U. S. Nat. Mus., vol. 66, 1925, p. 101.

Trimeresurus stejnegeri K. Schmidt, Amer. Mus. Novitates, no. 157, 1925, p. 4 (type-locality, Shao-Wu, Fukien, China); Bull. Amer. Mus. Nat. Hist., n. 54, 1927, p. 546, fig. 22; Pope and Pope, Amer. Mus. Novitates, no. 620, 1933, p. 5; M. Smith, The fauna of British India, Ceylon and Burma . . . vol. 3; Serpentes, 1943, pp. 517-518.

Trimeresurus gramineus stejnegeri: Stejneger, Proc. U. S. Nat. Mus., vol. 72, 1927; Pope, Bull. Amer. Mus. Nat. Hist., vol. 58, 1929, p. 478; Mell, Lingnan Sci. Journ., vol. 8, 1931, p. 218.

Trimeresurus stejnegeri stejnegeri: Pope, The reptiles of China, vol. 10; Nat. History Central Asia, 1935, pp. 418-422, fig. 77.

Lachesis gramineus: Boulenger, Catalogue of the snakes in the British Museum, vol. 3, 1896, pp. 554-556.

Diagnosis: First labial completely free from nasal; supraoculars narrow; dorsal scales keeled; head uniform green; hemipenes spinose; scalerows 21 or 19; ventrals, 155 to 169; a light ventrolateral line bordered by orange or chocolate; small white vertebral spots may be present.

Description of species: Rostral about as high as wide, small, sloping forward and upwards; upper head-shields smooth, flat; internasals not especially enlarged; seven scales bordering nasals; ten or eleven supralabials, first completely separate from nasal, second bordering loreal pit in front, third largest, touching subocular; supraocular transversely divided; two preoculars; an elongate curved subocular; two or three postoculars; supralabials behind third, separated from suboculars by two rows of scales; ten or eleven infralabials, three touching first chinshields; no second pair; numerous small scales between chinshields and first ventral.

Scalerows: 25, 21, 19, 15; ventrals, 155 to 169; subcaudals, 61 to 68.

Color: Light to dark green above, pale green to whitish below; a ventrolateral yellowish or whitish line bordered above by orange or chocolate brown; each ventral with a narrow posterior white margin; tip of tail brownish or pinkish; no light or dark markings on side of head; lip greenish.

Measurements in mm.: Total length, 750; tail, 145.

Distribution: There is only a single Thai record of this species, this from Hup Bon southeastern Thailand. It is known from Yunnan (China), Darjeeling (India), Assam and (?Upper Burma). M. Smith refers Burmese specimens having a scale-formula of 17, 17, 13, to this species. Their ventral count is 143 to 149, subcaudals, 57 to 60.

Remarks: The preceding description is derived from accounts of this species by K. Schmidt, Pope and M. Smith. The Thai specimen is a male with a scale-formula: 21, 21, 15; ventrals, 161; subcaudals, 65.

Trimeresurus erythrurus (Cantor)

Trigonocephalus erythrurus Cantor, Proc. Zool. Soc. London, 1839, p. 31 (type-locality, Ganges delta).

Trimeresurus erythrurus: Pope and Pope, Amer. Mus. Novitates, no. 620, 1933, p. 8; M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 386-523, fig. 165.

Trimeresurus bicolor Gray, Ann. and Mag. Nat. Hist., ser. 2, vol. 12, 1853, p. 292 (type-locality, India).

Trimeresurus carinatus Fayrer, The Thanatophidia of India, 1874, colored pl. 13.

Trimeresurus albolabris: M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, pp. 523 (*part.*).

Diagnosis: A rather stout snake, snout twice as long as eye (or a little longer); approximately 12-14 scales in a line between supraoculars; internasals large, separated by a single scale or in contact; first supralabial united with nasal; all or at least part of supralabials separated from subocular by two scalerows; scalerows, 21-25 about middle of body. Tail reddish to reddish brown above; when preserved (fomalin transferred to alcohol) color, dull lavender brown; chin and ventrals whitish; interstitial skin whitish.

Description of species (from No. 33543, Bangkok): Head broad, very distinct from neck; rostral slightly broader than high, in contact posteriorly with two broad internasals; latter scales nearly twice as wide as long; canthus distinct; internasal followed latero-posteriorly by a scale a little larger than other scales on snout, and this followed by an elongate scale lying above the "pit," touching two preoculars; supraocular not divided, separated from its fellow by from 11-13 scales; nasal single, pointed posteriorly; upper edge of nasal visible from above; no small loreals between nasal and second labial; supraoculars eleven, first fused with nasal; second forming front of sensory pit; third largest bordering third (lower) preocular and subocular; fourth separated from subocular by one scale, fifth and sixth separated from suboculars by two scales; two postoculars; pit surrounded by two lower preoculars and second labial; infralabials, 11-13 three bordering first chinshields; second chinshields smaller than first pair, followed by four paired scales, only second of which is separated by a small scale.

Scale-formula: 32 (occiput), 29, 21, 15; head scales strongly keeled, imbricate, pointed behind; dorsal scales sharply pointed on anterior part of body; median twelve rows more or less strongly keeled anteriorly, fewer rows posteriorly. Ventrals, 154; subcaudals, 54; anal, single.

Color in life: Above, head and dorsum dull yellow-olive to green, becoming reddish on tail; labials blue-green; (a narrow ultramarine line on outer scalerow continued to near tip of tail in male); chin blue, mixed with white; infralabials green; ventrals bluish anteriorly, yellowish green on sides gradually becoming more yellowish with a line of blue or ultramarine across each scale to vent; in subcaudal area, bluish to yellowish green, with a median diffuse line of magenta; eye yellowish. In preservative, lavender brown; side of head bluish white; lower part of supralabials white. Chin and ventral surface brownish white; outer edges of ventrals lavender; subcaudals largely same color as back, the scale edges whitish; skin between scales whitish.

Measurements in mm.: Total length, 712; tail, 117; body 6.08 times length of tail; width of head, 26.5; length of head, 32.

Remarks: Dr. Malcolm Smith has separated the Thai specimens, having the red to red brown tail and having 21 scalerows around body, from the Indian *erythrurus* (red tail) having 23 or 25 scalerows. I believe them to be the same.

Trimeresurus kanburiensis M. Smith

Trimeresurus kanburiensis M. Smith, The fauna of British India, Ceylon and Burma . . . Reptilia and Amphibia, vol. 3, Serpentes, 1943, p. 519 (type-locality, "limestone hills near Kanburi" [= Kanchanaburi]).

Trimeresurus puniceus: M. Smith, Journ. Nat. Hist Soc. Siam, vol. 7, 1928, p. 194; Bull. Raffles Mus., no. 3, 1930, p. 90.

Diagnosis: Supraoculars narrow; dorsal scales strongly keeled; head brownish; first supralabial completely separated from the nasal.

Description of species (from type-description): Snout twice as long as diameter of eye; upper head-scales small, subequal, feebly imbricate, smooth between eyes, keeled on back of head. Supraoculars rather large, transversely divided on their inner margins, eight scales between them; internasals twice as large as adjacent scales, separated by a single small scale; ten supralabials, first completely separated from nasal, third largest; a single series of scales between supralabials and elongate subocular; temporal scales small, obtusely keeled.

Scalerow-formula: 19, 19, 15, all strongly keeled; ventrals, 159; subcaudals, 42, paired; tail, prehensile; anal, entire.

Color: Brownish-gray, with a dorsal series of irregular brown spots, and smaller ones upon the sides; whitish on venter.

Measurements in mm.: Total length, 405; tail, 60.

Remarks: The type, a female, is unique, having been obtained in the limestone hills near Kanburi (Kanchanaburi) in the province of the same name.

This species resembles *I. puniceus,* which is a small member of the genus. It differs in lacking the raised canthus and the strongly keeled scales, and in being brownish-gray instead of reddish brown.

Puniceus has a strange habit of striking rapidly and repeatedly at nearby objects, sometimes as often as eight or ten times in five seconds! Nothing is known of the habits of *kanburiensis.*

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